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VETERINARY MEDICINE

SEPTEMBER 1944

CONTENTS

Veterinary Progress, Policies and Comment.....329-331

Substitute for Lactose in Penicillin Production, 329; Large Amounts of Lactose Needed, 329; Soldiers Food, 329; Radio Frequency Used in Drying Drug in Penicillin Production, 329; Organized Medicine Contests Decision of Selective Service, 329; Average Production of American Dairy Cows, 329; Horses on Farms, 329; Veterinarians First Used Caudal Anesthesia, 329; Harmful Effects of Use of Mineral Oil, 329; Why Vaccinate Calves Only? 330; Carrot-Corn Ensilage, 330; Ineffective Coccidiosis Treatments, 330; Penicillin for Swine Erysipelas, 330; Rat-Bite Fever Remedy, 330; Encephalomyelitis in 1944, 330; Urea to Supplement Protein Supplies, 330; Chinese and Modern Hogs Compared, 330; A Check for Peritonitis, 331; Paste for Liver Injury, 331; Red Blood Cells for Wounds, 331; Quinine Synthesized, 331; Death Rate in Armed Force Low, 331; Sulfadiazine in Meningitis, 331; New Oil Spray Reduces Spread of Bacteria and Viruses, 331.

Unused Measures for Brucellosis Control.....332

Food Inspection at New Orleans Port of Embarkation...333

Should Veterinarians Pay Employee's Withholding Tax.335

Veterinary Science Works Modern Miracle in Uganda..336

By-Products of the Meat Packing Industry.....339

The True Relation of Vitamin A to Respiratory Infections.342

Bovine Trichomoniasis 345

Comparative Value of Cooked and Uncooked Food for Growth and Development of Cats.....348

Cat Facts 349

Veterinary Practice in Montana.....350

Hormones 352

Clinical Reports 353-361

Were These Cases of Hypopituitarism, 353; Traumatic Gastritis in a Horse, 353; Large Foreign Object in Abdominal Cavity of a Fox Terrier, 354; Mistaken Identity, 355, Cattle Practice, 355; Follicular Mange—A Therapeutic Agent Warrants a Trial, 358; Diverticulum and Rupture of the Esophagus, 357; Poultry Practice, 358; Canine Leptospirosis, 360; Colt Survives Severed Jugular, 360; Uses of Artificial Insemination, 361.

Book Review 362

Diagnostic Methods in Veterinary Medicine, 362.

Useful Bulletins, Circulars, Etc.....362

Abstracts 362

Bovine Serum a Substitute for Human Plasma, 362; Soybean Meal an Adequate Protein for Growing Chicks, 362.

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The Institute of Paper Chemistry has found by experiment that starch dextrin can be used in place of lactose in the production of penicillin on corn steep liquor.

More than six million pounds of lactose will be used in 1944 in the manufacture of penicillin. This is approximately equivalent to the total annual production of milk sugar heretofore.

Acceptability to the troops is the first requisite of an Army ration. Nutritional adequacy ranks second, stability under expected storage conditions third and caloric considerations fourth—S. G. Henry, Maj. Gen., A.U.S.

It has been found by research engineers of Radio Corporation of America, that the use of radio frequency current will dry penicillin 48 times as fast as the freeze-drying method which is at present used in the production of the drug. The new method will result in a greatly lowered operating and maintenance, and also drug, cost.

Organized medicine (A.M.A.) is contesting the decision of Selective Service to deny deferment to premedics who were not enrolled, as such before July 1st. The A.M.A.'s contention: It will result in a shortage of doctors beginning in 1949. Selective Service answer: It will do no such thing, and quotes figures to prove it. Obviously neither is concerned with what they are talking about. The army wants young selectees *now* and the A.M.A. fears that unless there is a full enrollment in the medical schools next year, some of them may close, permanently.

The average production of the 26,000,000 American dairy cows is about 4,700 pounds of milk per cow a year; that of 800,000 cows under the Dairy Herd Improvement Association, 8,000 pounds. The world's record production for one cow is 41,943 pounds in one year.

The number of horses on farms declined during 1943, for the 29th consecutive year; from 9,675,000 in 1942 to 9,330,000 at the beginning of 1944. The number of mules declined also; from 3,704,000 to 3,559,000. The peak number of horses (on farms) was 21,431,000 in 1915, and for mules 5,918,000 in 1925.

Paeans of praise for caudal (epidural) anesthesia are now rising from the medical profession. The doctors have just discovered it! They have not yet learned that the veterinary profession has employed caudal anesthesia routinely for 18 years. So far, the medical profession knows of its value only in parturition but, given time, its members will learn, as veterinarians have long known, that it is useful in a wide variety of surgical operations.

According to the U. S. Department of Agriculture, mineral oil when ingested prevents the absorption of two fat-soluble vitamins, A and D, and two important minerals, calcium and phosphorus. Prolonged use of mineral oil may lead to deficiencies. In experiences at the Arizona station rats taking mineral oil required three times as much cod liver oil to supply the vitamin D required as did rats not given the oil. Puppies fed mineral oil could not use the calcium and phosphorus in their food to build a normal skeleton.

In a herd where there are several positive reactors to the agglutination test for brucellosis, it doesn't look good to me to vaccinate only the calves and leave the remainder of the herd to become naturally infected. I vaccinate the negative cows and heifers as well as the calves and my results have been good.—*A. E. Erickson,* Charlotte, Mich.

Carrot-Corn Ensilage

A highly palatable silage which gives good returns in milk and butterfat has been tried at the Ohio Agricultural Experiment Station. A ton of whole plant carrots were combined with 2¼ tons of overripe corn. When used, the carrots had the appearance of fresh vegetable. The butterfat produced was somewhat more yellow than ordinarily.

Ineffective Coccidiosis Treatments

In six experiments at Beltsville Research Center, when vinegar or acetic acid, in differing concentrations, was added to the drinking water of chickens it was completely ineffectual in the cure or prevention of coccidiosis, and was probably harmful since the chicks receiving it grew less rapidly than the controls.

Vinegar has long been a home treatment for coccidiosis and many quack coccidiosis cures contain acetic acid as the active ingredient.

Penicillin for Swine Erysipelas

When supplies of penicillin become more plentiful, it would seem that it will be an effective treatment for swine erysipelas—judging from reports of their laboratory experiments just made by Drs. Heilman and Herrell of the Mayo clinic.

In these experiments, of 40 untreated mice infected with the swine erysipelas organism, all died; however, of 40 infected mice treated with penicillin, only two died—a mortality rate of 5% instead of 100% as was the case with the untreated infected mice.

Rat-Bite Fever Remedy

Rat-bite fever, a very weakening and sometimes serious disease, may yield to penicillin treatment, it appears from studies reported by Drs. F. R. Heilman and W. E. Herrell, of the Mayo Clinic.

Rat-bite fever may be caused by either of two germs, *Spirillum minus* or *Streptobacillus moniliformis.*

Previous treatment for infections with these germs consisted in giving arsenic-containing drugs or gold salts. Both of which often may be followed by toxic reactions. One of penicillin's great advantages is that it does not cause such reactions.—*Sci.N.L.*

Encephalomyelitis in 1944

Chief Miller of the B.A.I. reports that 295 cases of encephalomyelitis in horses occurred in 21 states. Five states, Nebraska with 86, Iowa with 40, Minnesota with 24, Oklahoma with 23 and California with 22 cases, account for two-thirds of the total number.

Urea to Supplement Protein Supplies

A feeding experiment, recently completed by the Bureau of Dairy Industry, U. S. Department of Agriculture, demonstrated that dairy cows fed synthetic urea (made from coal, air and water) mixed with corn, oats, bran and bonemeal, produced as well as when fed the same grain and mineral mixture with soybean meal replacing the urea.

Urea contains no protein but it furnishes the nitrogen which bacteria in the paunch of the ruminant combine with other constituents of the feed to make protein. Only 0.3 pound of urea per cow per day is required to provide the necessary protein under all but exceptional dairy conditions. The cost of this amount is about one cent.

A great quantity of urea has been released by the WPB for use in cattle feeds.

Chinese and Modern Hogs Compared

Native Chinese hogs, particularly those of North China, though of many types, sizes and colors, are outstanding in prolificacy. Because of the large litters and high rate of survival, the average Chinese sow produces a greater poundage of weaned pigs than do many sows of improved modern breeds.

The general environment for raising hogs in China is less favorable than in the United States, yet Chinese sows frequently produce large litters, R. W. Phillips, of the U. S. Department of Agriculture, reports. One very exceptional sow had 32 teats and produced 25 live pigs in one litter.

Chinese native hogs become mature, sexually, at an earlier age than most of the American and English breeds. The gilts usually are bred when about five months of age, but it is not unusual for them to farrow their first litters soon after reaching six months of age.

Most Chinese hogs have relatively thick skins and, compared with modern breeds, they grow longer and stiffer bristles, which are an important source of income to their owners. In their ability to convert feed into pork, Chinese hogs are probably less efficient than the modern improved breeds, but this conclusion is based on only limited tests; some of the trials showed no apparent differences in feeding efficiency.

A Check for Peritonitis

Penicillin has been found by Navy medical officers to be effective in checking peritonitis which often follows delayed appendectomy.

It is also of value in peritonitis in dogs. Of 20 affected dogs that were given penicillin promptly, all recovered—of 27 not receiving the drug, the deathrate was 92.6% with average survival time of 57 hours. Even when there was an eleven hour delay in administration of penicillin in 19 affected dogs the death rate was only 21%.

Physicians of Temple University use a paste composed of plasma and cell extract mixture to paint over bleeding surfaces in cases of traumatic injuries of the liver and spleen. When pressed together firmly and held for about three minutes the parts adhere firmly and heal.

Red Blood Cells in Wound Treatment

Murray and Sharr of the medical corps of the Navy report good results in the treatment of slow-healing, anemic wounds with a paste made from human red blood cells, tragacanth and hexylresorcinol. The paste is applied topically and a large portion of it is absorbed by the tissues.

The erythrocytes are obtained in the manufacture of blood plasma. Successful use of these leftover red blood cells in the treatment of certain types of anemia has already been reported.

Quinine Synthesized

Synthesis of quinine has been achieved by the Polaroid Corporation of Cambridge, Mass. When war broke out the principal source of quinine, the Dutch East Indies, was abruptly shut off and at the same time the sending of vast numbers of troops into the tropics and sub-tropics increased enormously the need for this anti-malarial drug of first importance. By limiting the use of quinine to the treatment of malaria in both the civil and military populations and by substituting atabrine, plasmochin and other substitutes wherever practical, a desperate situation has been avoided but a source of quinine without depending upon exports will be most welcome. As yet the synthetic manufacture of quinine is only in the laboratory stage but there is promise that it may be adapted to commercial production. The raw materials are plentiful and inexpensive but the process of synthesis is extremely complicated.

Death rates from disease among our military forces, tens of thousands of whom are stationed in the most unhealthy regions in the world, is not only lower than those of World War I but lower than the annual death rate of the Army during the last 10 years of peace.

Sulfadiazine Used in Meningitis

Figures from the Office of the Surgeon General indicate that deaths from meningitis in the Army have been reduced 90% by the use of sulfadiazine. As little as two grams of the drug will banish the germs from the nose and throat for several weeks so that it is possible to prevent epidemics by occasional administrations of the drug to all members of a military unit.

New Oil Treatment Reduces Spread of Bacteria and Viruses

A highly promising odorless, greaseless, non-sticky oil treatment for floors, blankets and bedding that traps germs in hospital wards and barracks, has been developed in researches carried out by medical scientists for the Office of The Surgeon General of the Army.

The new oil treatment holds the bacteria and viruses of infectious diseases so tightly they cannot spread into the air.

Tests indicate respiratory ailments can be reduced 28 per cent by keeping the floors of barracks oiled and soldiers' blankets impregnated with an invisible, odorless, non-sticky oil film.

Actual counts of bacteria floating in the air showed even more remarkable declines. In hospital wards, oiling the floors cuts air-borne bacterial counts from 460 to 120 per cubic foot of air—a decrease of 74%. Giving the bed linen the oil treatment was even more effective. When this was done the bacterial counts dropped from 3,500 to 350 per cubic foot of air —a decrease of 90%. When both the floor and blankets were oiled, 97.2% of the bacteria that formerly floated through the barracks were trapped on the oil film.

Oiling ward and barracks floors is a simple process carried out by mopping. The treated floors cost only $6 per barrack and they will trap germs for four months.

Oil treatment for blankets costs only two cents a blanket and will last at least two months.

The invisible oil film adds from one to two per cent to the weight of the blankets, makes them warmer, and leaves them with unchanged appearance, feel or odor and creates no additional fire hazard.

Unused Measures for Brucellosis Control

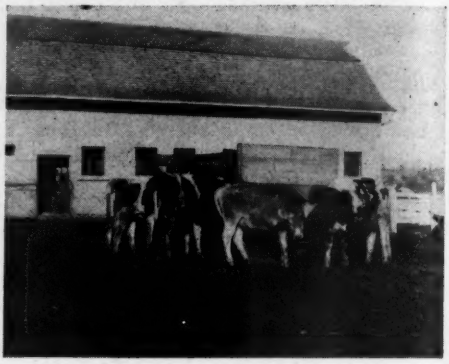
By S. L. STEWART
Olathe, Kansas

Practicing, as I have for many years in a dairy district (the Kansas City milk shed), it follows naturally that I have had a great deal of experience in handling brucellosis. The preponderance of evidence is, I think, that my efforts in the control of this disease have been satisfactory to my clients. I have employed vaccination consistently as one of the methods for combatting this disease for the past 25 years. Formerly the vaccines available to the practitioner were not nearly so effective as we should have liked them to be, but even in those days, when properly used, they improved the calf crop.

Since vaccines prepared from strain 19 have been available I have used them extensively and continuously, to the eminent satisfaction of myself and my clients. I hesitate to say that vaccination is or is not the most important factor in the control of brucellosis. For example, it is difficult to pick out the most important leg of a three-legged stool. The practitioner, whose ability is metered by results, cannot afford to coddle whims nor theories, nor can he afford to propagandize political expediency. In his war with disease, he can play no favorites, but must use all means that are effective. To neglect sanitation or nutrition or segregation or elimination or vaccination, yes, or education of the owner, is to lessen the degree of success that can be attained and, in many instances, to court failure.

The need for good sanitation is generally agreed upon. It pays dividends quite irrespective of its effect on brucellosis control. Nutrition is apt to be neglected by those not familiar with the day-to-day history of the herd. It is ignored in most swivel chair plans for brucellosis control, yet it has been established that mineral and vitamin deficiency and general inanition are as inimical to reproduction as infection. Segregation of a cow at parturition and when there is a vaginal discharge is just common sense. The separation of infective and susceptible animals is well founded, but often impractical, except by rendering the susceptible animals resistant to infection. Elimination of unprofitable animals is basic in animal husbandry. Probably only practitioners appreciate fully the pitfalls in disease control that confront one in the absence of intelligent cooperation on the part of the owner of the animals.

Most of the controversy as to methods of brucellosis control centers about the employment of vaccination as one of the measures to an end. Many specious and spurious arguments have been advanced against vaccination—arguments, in not a few instances, unworthy of their advocates. It is battling a straw man or attacking a windmill to declaim against indiscriminate vaccination. No responsible veterinarian advocates the practice. Its failure is not chargeable to the vaccine but to the authorities that fail to prevent this misuse of the vaccine. It is closing the mind to the demonstrations of research and the experience of thousands to oppose vaccination of adult animals in the average commercial dairy herd or in any herd where vaccination would be to the advantage of the owner of the herd. It is obstructing progress to oppose vaccination on the ground that it might delay the elimination of the disease, since it has been incontrovertibly demonstrated thousands of times that properly used, in properly selected herds, vaccination will hasten the day when the herd is free of the disease if the existence of the herd and the solvency of the owner are to be preserved. It is substituting supposition, superstition and ignorance for scientifically demonstrated fact to say that vaccination of adult animals entails a public health hazard.



What I think of the argument that a practitioner should go into an infected herd of a client and vaccinate only the calves and leave the noninfected adult animals to acquire the disease from natural exposure, would not look well in print. My contention is against regulations that not only fail to require the employment of all proved effective measures for combatting brucellosis but actually handicap the full use of one of the most valuable measures for its control and elimination from the average dairy or purebred herd of cattle.

Food Inspection at New Orleans Port of Embarkation

FRESH ham and eggs, fried chicken or a good American hot dog can mean a lot to a lonely soldier at some overseas outpost. It not only fills an empty place in his stomach, but serves to bring home a little bit closer.

Realizing both the vitamin value and the morale measure of fresh American foods "like mother used to serve," the Army extends every effort to fill fighting men's mess kits with products direct from American dairies, farms and stockyards.

Contrary to the popular belief that troops stationed outside the limits of continental United States eat nothing but canned or powdered rations, troops overseas receive a large variety of fresh vegetables, meats and dairy products wherever the tactical situation permits shipment of such materials.

"Certainly we ship out a lot of canned field rations," explains Lt. Col. Andy Crawford, New Orleans Port of Embarkation veterinarian, because it is not always possible to get fresh foods through to some units. In other localities there are no refrigerator facilities. However, we send fresh brands as often and to as many places as possible."

Shipping records of the New Orleans Port of Embarkation for an average month reveals that there are more than 17 times as many fresh shell as there are dried eggs shipped overseas. The New Orleans Port of Embarkation also ships cheese, butter, lard, every type of meat and poultry and green vegetables for the use of men overseas.

It is the popular belief that the Army veterinarian's only job is to look after the health of Army animals. However, the Army veterinarian is the official food inspector and grader of meats, dairy products, eggs, poultry and fish. He must maintain supervision over the sanitation of warehouses, refrigerator cars and ships, and also of freezer units.

Food is inspected many times from the time it is purchased until it is served to the troops. At a Port of Embarkation the veterinarian's job is doubly important since the shipment of unsound or improperly packaged or stored food to the fighting men in foreign theaters would result not only in the loss of the food but also, which is more important, in the waste of shipping space.

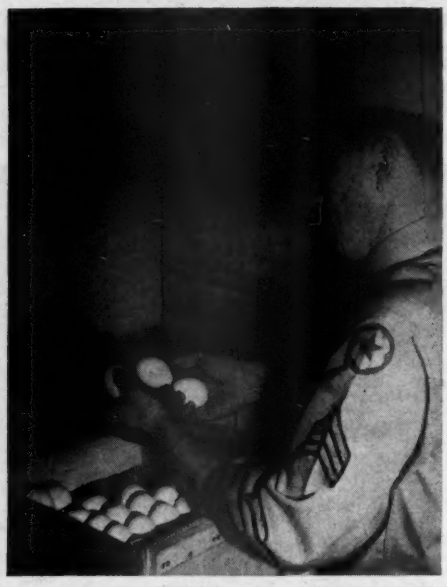
Official U. S. Army Signal Corps Photo

Lieut. C. R. Kelsey, assistant veterinarian at port, inspecting frozen chickens before they are placed on shipboard. Inspected meat in background

Each article purchased by the Army has been prepared according to specifications compiled by the government. Not one pound of food of animal origin can be accepted or shipped except upon the veterinarian's certification that it meets contract specifications and is wholesome. At a Port of Embarkation the veterinarian has the added responsibility of supervising the loading and storing of food aboard cargo and transport ships.

To fully understand how the veterinarian protects the health of soldiers overseas, Colonel Crawford explained how he and his staff inspect perishable items that come into the New Orleans Port for overseas shipment.

"Most people have the idea that dried eggs are prepared for overseas because shell eggs won't remain fresh. If kept at the right temperature and the proper degree of humidity, however, fresh eggs can be shipped around the world and still be fresh. The powdered egg



Official U. S. Army Signal Corps Photo
Sgt. Paul Timberman, Beckemeyer, Ill., candling eggs

is more desirable only because of the saving in storage space."

All eggs are inspected prior to purchase and a grade is stamped on the cases. Each time they are moved thereafter, 5 to 10% of the shipment is again inspected as a check.

"When we receive a shipment of eggs, several precautions are taken before they are stored aboard ship," the veterinarian says.

"First, we test the temperature of the refrigerator cars in which the eggs are received. Fresh eggs must be kept in a temperature of 28 to 34° F. and if the cars have not been kept within those limitations then we're in for trouble. If the temperature has dropped to 27½° F. or below, the eggs will be frozen and above 34° F. there will probably be a high percentage of spoilage."

However, the veterinarian's worry just begins when everything is set for loading. Ten per cent of the eggs must be uncrated and candled to determine spoilage. If many bad spots are discovered, the entire shipment must be inspected. Spoiled eggs are thrown out and those that won't stand the trip over rough seas but are still edible, are sent to Army camps in this country for immediate use.

"We are on the spot 24 hours a day until the ship is loaded," Colonel Crawford adds. "If every minute of the loading was not supervised someone might carelessly leave the eggs sitting on the wharf to spoil, or handle the crates with little regard for the fragile contents. Rough handling of egg containers can ruin eggs even without breaking the shell and thus nullify all precautions taken to assure that they arrive overseas fresh."

Finally, the veterinarian must be certain that the eggs have been properly packed and braced to prevent shifting at sea. Also that crating ventilation has been properly provided. The eggs will be again inspected after they are unloaded overseas.

Included in the meat list are lamb, beef, veal, pork, chicken, turkey, sausage (frankfurters) and sausage (bologna). These products are frozen before shipment and the temperature in freezer units must be kept below 18° F. for all types of meat.

The necessity of having sanitary freezer units is important. If fish or some rancid material has been carried in the car or ship, the odor will spoil the meat if the space has not been thoroughly cleaned.

The "hot dog" is still an American favorite wherever troops are stationed. It, too, is inspected for quality.

"We could even ship milk and ice cream overseas if we had sufficient quantity," Colonel Crawford says. "If milk is kept within 28 and 34° F. it will stay fresh for two weeks."

The men are served fresh milk and ice cream on troop transports, but the overseas supply consists chiefly of canned or powdered milk and ice cream mix. Again the factor of storage and cargo space is involved.

As a precaution against canned milk becoming granular, each case must be turned every 30 days.

All canned products are inspected at the Port of Embarkation for leaking, swelled or stinking cans, all of which indicate spoilage. The cans must also be lacquered and inspected for proper crating.

Before the cans reach the port the food has been inspected for spoils, amount of liquid or oil, temperature and amount of vacuum inside each can.

The duties performed by the veterinarian are too many to enumerate, but the purpose behind each job is the same—protection. Through constant inspections, he protects the Quartermaster who purchases food, the taxpayer who pays for the food and, above all, the troops who eat the food.—*Public Relations Department, OWI.*

Should Veterinarians Pay Employees Withholdings?

By HAROLD J. ASHE*
Los Angeles, California

FROM my own experience in handling income tax matters, I have found that considerable confusion still exists in the minds of professional and small business men, concerning the workings of the withholding tax. Time after time I have found such people paying the withholding tax out of their own funds instead of deducting from the employee as the law intends should be done.

Such an error is understandable because the law provides that where the employer fails to make such a deduction from the employee's pay check that the employer is responsible. This, however, was never intended to condone the practice, but rather to penalize employers who fail to cooperate by withholding. Harassed by employee demands for wage increases, many employers have conceived of this as a left-handed way of meeting the demand.

However, employers seeking an "out" and using this easy devise are in for trouble—if nothing more than an involved bookkeeping chore and, in some instances, severe legal penalties.

To clarify this question the Internal Revenue department has declared that where the employer has been paying the withholding tax of his employee that the employer must also consider the amount paid as withholding as additional employee wages and not a gratuity exempt from further withholding. That is, the withholding, itself, under such circumstances, is subject to a withholding tax.

Let's take the case of an employer who has a single employee with no dependents whom he pays $35.00 weekly. This employee's exemption is $12.00. The withholding tax—if actually withheld by the employer—is 20% of the remaining $23.00 or $4.60. However, where the entire $23.00 of taxable income remains in the possession of the employee because the employer undertakes to pay the tax, a new situation arises. To determine the correct amount of withholding tax, the employer must now consider the $23.00 as that *part* of the taxable income retained by the employee over and above the gross taxable income. The $23.00 now becomes 80% of the gross taxable income. Adding 20%, or one-fourth of 80% to get the whole, we now find that $28.75 is the total taxable income of the employee and this, with the $12.00 exemption, sets his wage at $40.75. This can be proved easily by subtracting $12.00 from the wage, taking 20% of the remainder and bringing up at the original premise. Thus the withholding tax becomes $5.75 instead of $4.60 which it would be were it actually withheld. This results in the real wage being increased from $35.00 to $40.75.

Using $35.00 instead of $40.75 as the wage, the employer would be under-remitting for social security and unemployment insurance. At a later date the employee would suffer to this extent in his benefits.

The employer, himself, in order to make his proper income tax return would have to report such employee's withholdings paid by the employer as wages. An alert check by Internal Revenue auditors would result in disallowing it as an expense if shown as payment of employee's withholding. Or at least a call for explanation and justification.

It even puzzles Sherlock Holmes

If the veterinarian employs eight or more employees (bringing him under jurisdiction of the Wage & Salary Stabilization Act) as is the case with some who maintain animal hospitals, he could be severely penalized. Under such circumstances the payment of employees' withholdings would be as much a wage increase as a more direct raise, even though the employer had honestly not thought of it in that light.

The penalty that might be attached to such an offense could be the denial for purposes of making out the income tax return of all of the wages and salaries of all of the employees receiving such an increase in wages by the device of paying their withholding tax.

The disallowed wages could easily double or triple the net income subject to income tax of the employer. In fact, it would be possible for the income tax so computed to be greater than the actual income that the taxpayer had for the year.

*Tax counsellor.

Veterinary Science Works Modern Miracle in Uganda

By R. J. SIMMONS
Entebbe, Uganda, Central Africa

VETERINARY services have made a striking contribution to a remarkable development of Uganda as a livestock raising territory. Even 10 years ago the popular idea of a native African stock owner as one who roamed about, peacefully and ignorantly, with his flocks and herds was quite true. But, in 10 years, he has abandoned his age-long habits and overcome his instinctive aversions to novel, modern ideas. For that change-over in his mental outlook great credit is due him.

To this co-operative frame of mind the recent development of Uganda is due, and, also, to British enterprise. The Department of Veterinary Services has played a big part in it, so that the Protectorate's livestock industry is now established on a sound basis and valued at eight million dollars a year. From the 1936 figure of 20,943 the total of hides and skins produced in Uganda has soared to about a million a year since the war began; so that, for one produced then about 48 are produced now—a rise with its own implications of modern technic and African adaptability.

Longhorn oxen in Uganda

The old, native method of stock-keeping was, for the African, a logical one. Livestock was an important factor in his life. It paid for his wives and was a kind of currency in barter. Cattle also figured in ceremonies of religious significance. He valued quantity rather than quality, and considered it of little importance that the acquisition of large numbers, as an end in itself, had the effect of deteriorating the value of his cattle.

Introducing modern stock-raising methods to a people with this traditional outlook was not easy; it had to be approached with care. The African farmer could be convinced only slowly that the weeding out of surplus stock would be beneficial; that it would provide money to buy the things to make his life more comfortable, and even result eventually in a progressive improvement of his herd's quality and worth. Likewise he knew nothing of the use of vaccines and sera. Their benefits, too, had to be proved.

Uganda's Veterinary Department first concentrated on the control of rinderpest and other epizootic diseases and, as the stockowner acquired a greater sense of security, efforts were made to change his outlook on stock ownership and encourage a greater appreciation of the monetary value of the stock.

Stock markets were therefore organized on a small scale, and traders and butchers encouraged to attend. Stock routes were organized, quarantine grazing areas allocated where cattle were kept and inspected carefully prior to movement, and special rates for stock arranged on the lake boats and on the railway.

At first the more enlightened, or the more courageous, owners set an example by sending to the markets their oldest and poorest stock. Here the veterinary officers auctioned

off these animals to ensure the best prices and immediately handed over the money to the stock raiser.

After that start was made, new areas were tapped, new markets opened and new routes organized. Today, many hundreds of thousands of cattle, sheep and goats, representing some 20% of Uganda's stock population, are sold annually in the organized markets, and the proceeds spent on improved housing and children's education, also for the purchase of bicycles, lamps, clothing and other such amenities, that were at one time beyond the reach of the African.

The benefits of the expanded and organized industry are manifold both to the people of Uganda and to the Allied war effort. The Protectorate now carries 2,500,000 cattle and 3,250,000 sheep and goats and the income from the industry is, as has been stated, more than $8,000,000 a year. Since the start of World War II some 400,000 cattle and a million sheep and goats have been produced for food each year.

Apart from feeding the peasant farmer and his family in the lightly stocked areas which produce the maize, cotton and peanuts now so vitally needed, this meat feeds the prisoners-of-war, the refugee camps and the labor engaged in vital public services.

The hide industry, for which figures have already been quoted, has assumed a new importance as well as hit new high levels since the war. With the necessity for utilizing shipping space to the best advantage, it became necessary to ensure that nothing but the best was placed on the market.

Intensive propaganda by veterinary officers and their African staffs, supported by demonstrations of better methods of preparation, rapidly changed the old method of sun-drying the pelts on the ground to the new one of drying them in suspended frames in the shade. The improvement in the quality of the product has won the praise of the Ministry of Supply in this country. Thousands of British troops and civilians are walking on Uganda leather that would not exist except for this educational campaign of the Veterinary De-

Ankole Longhorn bull in Uganda

partment and the receptiveness and co-operation of the African stock-owner.

Another important by-product of the industry is ghee—or clarified butter fat—which at the beginning of the war was in short supply. Since the setting up of buying-posts throughout the stock-raising areas, local needs are amply satisfied and a handsome surplus left over for export. Some 500,000 pounds of ghee is now sent to Kenya annually.

Uganda has also been able to help a neighboring colony in her food production campaign by supplying many thousands of ploughing oxen, apart from supplying a thousand head of fat cattle monthly to the meat cannery in the territory.

Herdsmen with Uganda cattle

Recent developments include the registration of herds approved for bull-breeding, and the Veterinary Department intends to issue, free, selected bulls of an improved type in districts where the stock needs to be improved. Trained African assistants will give advice, run their own dispensaries and treat all minor ailments.

Piggeries large and small are becoming popular and pork is now a common article of diet. Arrangements are being made for the issue of pure-bred boars and sows in order to improve the local breed. Purebred English fowls have also been issued.

Increased and cleaner milk production is another objective, and many owners are already using the most up-to-date methods with regulation milk pails, filters, pans, etc. Innumerable small and well-kept dairies are springing up within each of the main townships, and milk is delivered in sealed bottles.

The veterinary services have, at last, after much spadework, gained the confidence and enlisted the co-operation of most African stockowners and are paving the way for post-war development, feeling secure that the livestock industry of Uganda has been established on a sound basis and that the native population has amply shared in the general benefits—benefits that will surely increase during coming years.

Barnyard Vitamins

The bovine rumen is known to be an efficient B complex vitamin factory, but it remained for Bohstedt of the Wisconsin agricultural experiment station to deduce and prove by experiment that cow manure is rich in these vitamins. By adding it to pig rations he speeded up their growth. Halpin, also of the Wisconsin station, by adding cow manure to the poultry ration reduced cannibalism among chickens.

Crossbreeding for Beef Production

Crossbreeding for hybrid vigor, the process used in the production of hybrid corn, may also be a means of increasing beef production if the results of experiments under way at the U. S. Department of Agriculture Range and Livestock Experiment Station, Miles City, Montana, are confirmed by further testing and practical experience.

In the Montana tests the first cross was made by mating purebred Shorthorn bulls with Hereford cows. Females from this cross are being mated to purebred Aberdeen Angus bulls. The triple-cross heifers will then be mated back to Hereford bulls.

Offspring of the first cross in the series have already been compared with purebred Hereford steers raised on the same range and fed out for the same period under identical conditions. Based on a two-year feeding trial the results showed the following advantages for the crossbreeds:

Greater production per animal unit as shown by heavier weight for age; heavier weaning weight of calves; greater gain in calves; fewer digestive disorders in the feed lot; more uniform gain in finishing; greater returns above production costs either as weanling calves or fattened steers. The conditions of the experiment were carefully controlled. Similar results cannot always be expected from indiscriminate crossing of ordinary beef cattle.

By-Products of the Meat-Packing Industry and Their Uses

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THAT man depended upon animals throughout the ages is shown by fossils and the remains of animals found in caverns and tombs. The exact role that animals played in human welfare thousands of years ago can only be surmised, because historical references are meager. At any rate it is safe to assume that in prehistoric times animals furnished man with materials for food, clothing and presumably for other domestic as well as religious, and esthetic purposes. Not until many centuries later were animals employed for labor, warfare, sport and recreation.

Our American ancestors, being frugal, salvaged from the carcasses of their food producing animals, at time of slaughter, considerable visceral fat and certain other parts of the killing offal. Because they had facilities for processing only a part of this offal into materials of commercial value, a great deal of it was necessarily discarded as worthless.

It was not until the packing and related industries developed new and improved methods of recovering, from packing house wastes, materials of economic significance, and not until artisans, industrialists, and chemists learned how to utilize these new preparations that animal by-products became important sources of revenue. At present the killing offal alone yields more than enough to cover all slaughtering costs. The cutting offal is all utilized. As a result livestock producers receive better prices for their animals and we are able to enjoy many of the comforts of life demanded by our present mode of existence, but which our forefathers could not secure at any price because they had not been produced.

For general purposes the various by-products may be classified in the manner indicated in Table I. These classes are of commercial importance and are significant in the business world. Only representative examples under each main group are indicated. Sources are not indicated but can be found readily by referring to Table II.

Packing-house by-products are largely derived from inedible materials as the accompanying tables graphically show. Consequently the edible materials employed by packers in sausage making and for certain other purposes are not included, although strictly speaking, they also might be termed by-products. Many of the more highly specialized manufactured products, which must be put through a number of technical processes before they are in finished form for consumer use, have also been omitted. Exceptions are the products prepared from glycerol, a by-product of soapmaking, which are included because of their general interest (Table II).

TABLE I.—GENERAL CLASSIFICATION OF BY-PRODUCTS

Foods: brains, meat juices, kidneys
Feeds: bone meal, meat meal, tankage
Fats and oils: edible and inedible derivatives
Fibers: hair, wool, bristles
Hides: gelatin, glue, leathers
Pharmaceuticals: glandular products, preparations from blood
Miscellaneous: fertilizers, chemicals, novelties

Table II is unique in that it lists the by-products under the various organ systems of the animal body. This method of presentation eliminates repetition, as is necessary if all by-products of different species are listed.

Attention is called in particular to the endocrine gland extracts used in substitutional hormone therapy. A differentiation is made between the extracts of the true ductless glands, which secrete internally, and the extracts of the glands which pour their secretions directly into the digestive canal, that is, secrete externally. Glands which secrete both internally and externally are known as "dual purpose" glands, but they have not been designated as such in the outline. Specifically they are the ovaries, placenta, testes and pancreas. If the by-products secured from both the dual purpose and true endocrine secreting glands were counted, the total number of items would be more than the 127 listed by Young.[1]

Veterinarians are especially interested in the endocrine gland extracts, most of which have been developed since 1920, because they have proved so useful as remedies for certain reproductive disturbances.

The by-products of poultry, although numerous and important, are not listed in Table II. Besides the age-old use for pillows feathers are now ground and used for insulating arctic clothing, the gluey protein (keratin) is drawn into threads and spun like yarn, and feather glues are used in plywood. Soap stock oil is recovered when offal is made into meat scrap and tankage, etc.

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[1] H. H. Young: By-Products of the Meat-Packing Industry. *Chem. and Eng. News*, 20 (Dec. 25, 1942).

TABLE II.—SYSTEMATIC CLASSIFICATION OF BY-PRODUCTS

THE SKELETAL SYSTEM
Manufacturing Bones
- Artificial teeth
- Novelties
- Toilet articles

Edible Bones
- Fats and derivatives
- Marrow extracts
- Ossein gelatin
- Phosphates

Miscellaneous Bones
- Bone charcoal
- Bone fertilizers
- Bone glues
- Bone meal feeds
- Bone oil
- Bone tar
- Neatsfoot oil
- Tallow

THE CIRCULATORY SYSTEM
Whole Blood
- Albumin
- Animal feeds
- Colloid stabilizer
- Flour (soluble)
- Meal (insoluble)
- Plasma
- Serum

Blood Cells
- Hemoglobin
- Leucocytes

THE NERVOUS SYSTEM
Brains
- Cephalin
- Lecithin
- Thromboplastin

Spinal cord
- Cholesterol
- Sphingomyelin

THE RESPIRATORY SYSTEM
Parts
- Hog snouts
- Larynx
- Lungs
- Tracheas

THE DIGESTIVE SYSTEM
Walls of the Canal
- Instrument strings
- Racket strings
- Surgical sutures
- Sausage casings
  - Weasands
  - Middles
  - Rounds
  - Bungs

Liver
- Bile acids and salts
- Cholesterol
- Concentrate
- Extracts (vitamins)[2]
- Gall bladders
- Gall stones
- Heparin
- Meal

Miscellaneous
- Fertilizers
- Peck
- Paunch and contents
- Spleens (melts)
- Tankage

THE MUSCULAR SYSTEM
Meat
- Animal feeds
  - Cheek meat
  - Giblet meat
  - Gullet meat
  - Head meat
  - Weasand meat
- Glue from sinews
- Meat extracts
- Meat juices
- Meat meals

THE UROGENITAL SYSTEM
Organs
- Amnion
- Embryos
- Fetuses
- Genitals
- Kidneys
- Udders
- Urinary bladders

THE SPECIAL SYSTEMS
Skin in the raw
- Fresh frozen hog (gelatin)
- Bacon rinds (gelatin)
- Inedible trimmings
  - Technical gelatin
  - Textile sizing
  - Protective colloids

Skin as leather
- Bags
- Balls
- Belts
- Bindings
- Chamois
- Clothing
- Gloves
- Harness
- Lacings
- Novelties
- Saddles
- Shoes
- Whips

Hair and Wool
- Brushes
- Curled hair
- Fabrics
- Feltings
- Filters
- Hats
- Insulations
- Mohair
- Ointment base (lanolin)
- Padding
- Plaster retarder

Horns and Hoofs
- Fertilizer
- Keratin meal
- Novelties
- Stearin

GLANDULAR SYSTEM
Gland Extracts (Internal secreting)
- Adrenal (adrenalin, cortin)
- Ovarial (estrogen, progestin)
- Pancreatic (insulin)
- Parathyroidal (hormone)
- Pituitary (pituitrin, gonadotropins)
- Placental (estrogen)
- Testicular (androgen)
- Thyroidal (thyroxin)

[2] Especially riboflavin or B_2.

Gland Extracts (external secreting)
- Gastric (rennin, ventriculin, pepsin)
- Intestinal
- Pancreatic (pancreatin)

FATS IN GENERAL

Edible Fats
- Lard oil
- Lard stearin
- Margarine
- Neutral lard
- Oleo oil
- Oleo stearin
- Shortenings

Inedible Fats
- Candles
- Cutting oils
- Fatty acids
- Glycerol (by-product of soap manufacture)
  - Anti-freeze
  - Blacking
  - Confectionery
  - Cosmetics
  - Cyclopropane
  - Nitroglycerin
  - Pharmaceuticals
  - Plastics
  - Plasticizers
  - Printers inks
  - Solvents
- Grease oil
- Illuminating oils
- Lubricants
- Soap
- Stearic acid
- Sulfated fats
- Tallow oil

In conclusion attention is drawn to studies recently conducted at the University of Wisconsin on slaughter-house offal. One investigation was aimed at finding a substitute for horse meat in the fur animal ration because horses are getting scarce and bringing a higher price than formerly.

After analyzing various by-products to determine their probable value as feed the investigators decided on the following combination: tripe, 20 parts; calf heads, 15; cattle weasands, 12; salivary glands, 7; calf tongue trim, 6; calf trachea and weasand, 5. In a five-month feeding trial with foxes this mixture replaced two-thirds of the horse meat in some lots and all of it in others with satisfactory results.

In a recent discussion[1] Campbell and Gibbard list 12 outbreaks of typhoid fever, comprising 1567 cases, due to cheese-borne infection. Other organisms commonly associated with cheese-borne infections are various members of the *Salmonella* genus and *Shigella dysenteriae*. Cheese-borne food poisoning has been attributed also to *Clostridium botulinum* and *Staphylococcus*.

[1] Campbell, A. G., and Gibbard, J., Survival of *E. Typhosa* in cheddar cheese manufactured from infected raw milk. *Can. J. Pub. Hlth.*, 35:4 pp. 158-164, 1944.

Popular Misconceptions

1. A pure-bred female bred to a scrub male will never subsequently produce pure-bred offspring.
2. Intestinal worms always cause a noticeable increase in the appetite of the host.
3. Gritting the teeth while sleeping, in a child, always indicates intestinal worms.
4. When a pregnant female is frightened or profoundly affected by an unusual sight, the appearance of the offspring may be affected.
5. Slitting the skin and putting salt in the wound prevents various infectious diseases, particularly blackleg.
6. Eggs with a relatively high specific gravity are fertile.
7. Short periods of cooling are beneficial to incubating hen eggs.
8. Long, narrow hen eggs produce roosters.
9. The temperature of a broody hen is much higher than that of a laying hen.
10. Underground crops (e. g., potatoes) should be planted during the dark of the moon; above ground (e. g., corn), during the light phase.
11. Feeding garlic cures gapeworms in poultry.
12. A horse may "pull himself blind."
13. Watering a horse immediately after he has eaten washes most of the feed out of the stomach.
14. Excising the third eyelid relieves tetanus in horses.
15. Some persons can stop hemorrhage by pronouncing certain "magic words."
16. Operations should be performed only when the sign of the zodiac is right for the part operated upon.
17. "Horn flies" may eat their way into the horn core.
18. Cats born in the fall shed hair continuously.
19. Animals weigh more dead than when they are alive.
20. Fits in dogs are caused by worms in their tails; rabies by a worm in the tongue.
22. Running a hot iron through a fold of the skin cures distemper in dogs.
23. Dogs are more susceptible to rabies during "dog days" than during the remainder of the year.

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Whey Valuable for Livestock

The 6 or 7% of dry matter in whey is of high nutritional value, including as it does protein, fat, milk sugar, minerals and vitamins. All of it should be properly utilized for feeding live stock. It is an exceptional feed for swine and if handled in a cleanly manner is useful for calf feeding.

The True Relation of Vitamin A to Respiratory Infections

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THE frequent occurrence of infections in vitamin A deficient animals, and the apparent lowered resistance to infections in human beings receiving low intakes of vitamin A have led to the erroneous idea that vitamin A prevents infections by direct action. The accepted explanation for the association of vitamin A deficiency with infections of the respiratory tract involves the changes in the physiological functions and anatomical structure of mucous membranes produced by an inadequate intake of this vitamin. By direct action vitamin A preserves the normal physiological function and anatomical structure of the mucous membranes and also aids in the regeneration and restoration of these membranes in the event they become injured or destroyed by pathogenic agents or trauma. By this direct action it may be said that vitamin A maintains an effective barrier against bacterial invasion and that the pathological changes occurring in the membrane in vitamin A deficiency break down this barrier, permitting growth of bacteria and invasion of the membrane by the bacteria. When an infection has become established by such a mechanism or when infections have entered by routes other than the mucous membranes, for example, the blood stream, vitamin A cannot, except in the presence of severe vitamin A deficiency, alter the course of the infection or effect a cure. The maintenance of a barrier against infections entering by way of the mucous membranes by supplying adequate amounts of vitamin A may be emphasized, but the correct nature of the action of vitamin A should be borne in mind. Vitamin A is a useful prophylactic agent against bacterial infections entering the mucous membranes, but it should not be termed the "anti-infective" vitamin.

Pathologic Changes in the Respiratory Tract in Vitamin A Deficiency

The surfaces of the normal mucosa of the nose, nasal sinuses, trachea and bronchi consist of ciliated epithelium which is bathed in the secretion products of the mucosal glands. The cilia beating rhythmically keep the mucous secretion moving constantly in one direction so that foreign matter including bacteria are constanly being moved toward the pharynx where the secretions containing the foreign material are either expectorated or swallowed. The respiratory tract is thus freed of objectionable material and bacteria by this mechanical action and also by the bacteriolytic action of lysozyme contained in the secretion. In vitamin A deficiency the ciliated epithelium is replaced by a flattened keratinizing type. The mucous and serous glands and their ducts undergo similar changes resulting in atrophy or cyst formation and, as a result, the secretory function of these glands is greatly disturbed. In the nose and nasal sinuses the mucosa appears reddened, shrunken and dry with a tendency toward crust formation. As a result of these changes infections of these cavities may become established.[1]

Pathology of Colds

The pathological changes, in the mucosa of the nose, trachea and bronchi, caused by cold infection, are practically identical with the changes produced by other virus diseases, such as influenza and distemper, that affect the upper respiratory tract. Such viruses enter and bring about the destruction of the ciliated surface cells of the mucous membranes. These cells are largely sloughed away by the second day of a severe acute cold infection.[2] At this stage these ciliated cells may be observed by microscopical examination of smears made of the nasal secretion. After three or four days and under favorable conditions, the exposed basal layer of epithelial cells begins to multiply, and pushing up a new layer of cells replaces those that were lost.

These latter cells become mature and acquire cilia which function in the same manner as the original ciliated cells. If, however, a severe secondary bacterial infection becomes established immediately following the acute stage of the cold, the process of regeneration may be interfered with to such an extent that a flattened type of epithelial cell is formed in place of the normal ciliated variety. If the bacterial infection is prolonged and large areas of the nasal epithelial cells are converted to the flattened (keratinized) type, chronic rhinitis (catarrh) becomes established. The pathological picture is similar to that of vitamin A deficiency.

In addition to the anatomical derangements in the surface epithelium, the cells of the mucous and serous glands of the mucosa of the respiratory tract undergo changes. In the acute stage of a cold infection, these glands become swollen and secrete large quantities of a watery fluid. When the acute stage is

passed, swelling subsides and the glands secrete a less abundant and more viscous fluid. If secondary bacterial infection sets in, or if other conditions exist—such as vitamin A deficiency—which interfere with the regeneration of the normal type of ciliated surface cells, the function of the serous and mucous glands is disturbed to such an extent that they may become cystic or undergo atrophic changes. In vitamin A deficiency and in chronic atrophic rhinitis these glands become plugged with keratinized cells. As a result, the amount of their secretion is insufficient to maintain a satisfactory degree of moisture on the surface of the membrane. This not only reduces surface moisture, but it also decreases the amount of lysozyme necessary to prevent growth of bacteria. Sullivan and Manville[3] showed that the lysozyme content and the rate of lysozyme production in the tissue cells was not disturbed in vitamin A deficiency, but that the interference with secretion of lysozyme mucous created by the deficiency, renders the tissues incapable of utilizing lysozyme as a defense mechanism.

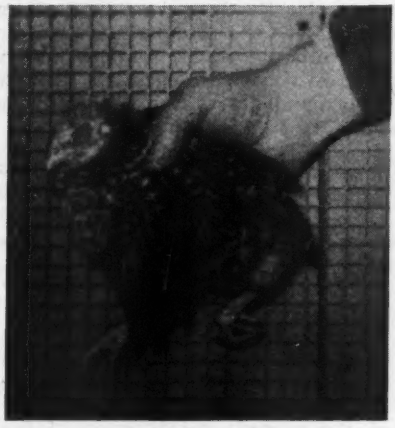
Role of Vitamin A in Maintaining Normal Epithelium

The addition of vitamin A to the diet of depleted animals converts the keratinized epithelium to the normal ciliated type. Reparative changes in the respiratory mucosa begin as early as the fifth day[4] provided the stage of depletion is not too far advanced and severe infection is not well established. The initial changes involve the separation of the outer keratinized cells and loss of the flattened cells in the intermediate layers. The basal layer of cells survive. These cells multiply, giving rise to cuboidal cells which are moved outward to the periphery where they become elongated and finally acquire cilia and function in the same manner as the original ciliated cells. As the surface cells are replaced with the normal type, reparative changes take place in the mucosal glands. The atrophied glands become larger, keratin plugs are removed from the ducts and those glands that had disappeared are replaced by new glands that are regenerated from ingrowth of cells from the basal layer. As the normal anatomical structure of these glands is restored, function returns so that the surface epithelium again receives a continuous mucous secretion.

In view of the lack of knowledge concerning the exact manner in which vitamin A maintains the normal structure of epithelial tissue, this question at the present time is open to speculation. Certain investigators believe that vitamin A acts as a catalyst influencing metabolic processes within the cell and that it is concerned with the transport of oxygen. How vitamin A affects the structure and function of surface epithelium has not been explained. However, the structural changes that develop during the deficiency, as described above, suggests that vitamin A may be essential not only for maintaining the structural integrity of the mucous membranes but also for the repair and regeneration of epithelium that had been damaged by cold or distemper virus or other agents.

Role of Vitamin A in Bacterial Infections

After McCollum[5] and Daniels[1] and her associates reported their observations on the development of respiratory infections under con-



Although watery eyes are an obvious symptom of a cold, it is the pathological changes in the mucosa of the nose, trachea and bronchi that are important

ditions of vitamin A deficiency, the interest of many investigators became focused on the so-called "anti-infective" action of vitamin A. The low content of vitamin A in the livers of persons dying of infections,[6] the decreased vitamin A concentration in the blood during infections[7] and the persistent increased susceptibility to infections of children fed on inadequate diets during the first few years of life[8] support the "anti-infective" concept of the action of this vitamin. These and other studies indicate that deficiency of vitamin A does lower resistance to bacterial infection in both man and animals. However, because of the fact that the lysozyme content of the cells is not decreased and also because no evidence has been presented to show that the immune antibody-forming capacity of the individual is disturbed, the protective action of this vitamin against infections is an indirect one. By preserving the normal structure and secretory functions of the mucous membranes, vitamin A maintains a barrier against bacterial infection. Changes in the membranes, incurred by vitamin A deficiency, render local conditions favorable for bacterial growth and lower the

threshold of resistance to bacterial infection through this portal. There is little evidence to support the supposition that administration of large doses of vitamin A is effective in curing bacterial infections once the barrier has been removed and the infection established.

Nevertheless, since the stores of vitamin A are readily diminished and the absorption and utilization of this vitamin interfered with during the course of infection,[9] greater amounts of vitamin A are required during an infection than at other times. Therefore, to prevent any sequelae that may be attributable to vitamin A deficiency, the patient with an infection should receive the benefit of large doses of vitamin A. This is particularly true in young animals with infections. In this group of patients two factors are operative in increasing the demands for vitamin A—rapid growth as well as the infectious process.

Role of Vitamin A in Virus Infections

While vitamin A does not affect the production of antibodies against viruses any more than it affects formation of antibodies against the bacterial pathogens, the story on this vitamin in cold, influenza and distemper virus infections differs. Many conflicting reports as to the value of large amounts of vitamin A in preventing colds in the human family, have appeared. While this question has not been definitely answered, the present consensus appears to be that vitamin A in excess of that supplied by a good diet has no influence on the incidence of colds, but that it may shorten the duration of a cold and reduce the incidence of secondary bacterial respiratory infections.[10] A tenable explanation of this latter effect based on the pathological changes in the mucosa during a cold infection is offered.

By direct action vitamin A preserves the normal physiological function and anatomical structure of the mucous membranes. It also aids in the regeneration and restoration of the ciliated epithelium cells of the mucous membranes of the respiratory tract when they have been destroyed by virus infection, such as influenza or distemper. Normally the ciliated epithelium, by rhythmic motion, frees the respiratory tract of objectionable foreign matter and bacteria.

This author has been routinely administering large doses of vitamin A to canine patients during the course of distemper and has noted that apparently the incidence of such secondary infections as pneumonia, enteritis and encephalitis has been reduced. In addition the catarrhal nasal discharge, when present, was scanty and responded readily to treatment (nasal drops of racephedrine hydrochloride 0.5%). The author feels that anorexia was lessened in the patients receiving supplements of vitamin A. The vitamin A was easily administered in the form of super A vitamin concentrate capsules[11] which contained 25,000 U.S.P. units of vitamin A per capsule. The patients were given from 100,000 to 500,000 U.S.P. units of vitamin A daily.

Possible Action of Vitamin A in Reducing Duration of Cold Infection

As described above, the cold virus (also influenza and distemper viruses) enters and destroys the ciliated surface epithelial cells. Following their destruction these surface cells are cast off, leaving the basal layer of cells exposed. If vitamin A is available to this tissue in abundant amounts, cellular regeneration with complete replacement of functional ciliated cells, the same as those lost takes place. If the vitamin A intake is not sufficient to compensate for the increased demands induced by the infectious process and if the vitamin A reserves become reduced to a deficiency level, the basal layer of epithelial cells is likely to regenerate a flattened, keratinized type of epithelium. If the process of regeneration should be so deranged, the pathogenic bacteria which are usually present in the upper respiratory tract would be encouraged to multiply and the mucosal lining would be vulnerable to their invasion. Under such conditions the duration of the cold infection may be prolonged and thus the cold may advance into a chronic bacterial respiratory infection. The inclusion of vitamin A in adequate dosage in the treatment of respiratory infections is certainly worthy of consideration.

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Bovine Trichomoniasis*

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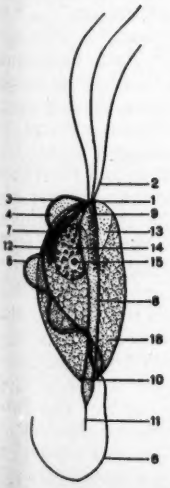
BOVINE trichomoniasis is a disease of the generative tract of cattle, characterized in the female, by early abortions, pyometra and sterility. The disease is caused by a flagellated protozoan organism, *Trichomonas foetus*.

The disease was first reported in 1900 by Mazzanti, who recovered the trichomonad organism from the vaginas and uteri of three heifers, slaughtered because of incurable sterility. His work remained unnoted for a quarter of a century because of the general belief that *Brucella abortus* was the cause of bovine abortion and sterility. In 1925, Hopfengartner reported finding trichomonads in the stomach content of an aborted fetus; and Pfenniger in 1927 discovered trichomonads in the peritoneal, pleural and pericardial fluids of aborted fetuses. Most of our present knowledge of bovine trichomoniasis was brought to light by the work of Abelein (1929-1932), a practicing veterinarian in the region comprising southern Germany, upper Austria and Switzerland. Abelein found that *Trichomonas foetus* was the causative organism of many cases of pyometra in cows free of brucellosis; he also found the organisms in the prepuces of bulls having poor breeding records. In this country, Emmerson (1932) was the first to report the occurrence of the disease. Since that time the disease has been reported from scattered areas throughout the United States. The disease is apparently on the increase and someday may engender a rather serious sterility problem.

Trichomonas foetus is a flagellated protozoan somewhat larger than a leucocyte but smaller than the epithelial cells usually found in vaginal smears. The organisms vary in shape from oblong to nearly circular with intermediate gradations and are very motile—the amount of motility varying to some extent with the temperature of the media. This motility is accomplished by extending the anterior flagella forward and lashing them backwards while the undulating membrane is moving in wavelike movements. This gives the organism a spiral, slightly jerky forward movement. This movement is typical and is an aid to diagnosis. The organisms have no sexual reproduction, but multiply by cell division; they are very difficult to culture and soon die outside the animal body.



Diagrammatic drawing of protozoan *Trichomonas foetus* (Riedmuller): (1) blepharoplast; (2) anterior flagella; (3) posterior flagellum as margin of the (4) undulating membrane; (5) accessory filament in the undulating membrane; (6) posterior free flagellum; (7) costa; (8) axostyle; (9) endoaxostylar granules in the capitulum of the axostyle; (10) chromatic ring about the axostyle at point of emergence from the body; (11) terminal spine of axostyle; (12) parabasal body; (13) cytostome; (14) nucleus; (15) caryosome; (16) undifferentiated cytoplasm.—*From Wenrich and Emmerson, 1933.*

Method of Transmission

The *Trichomonas foetus* is transmitted from the bull to the cow or *vice versa* during coitus. It may be transmitted experimentally by inoculation of a living culture of these organisms into the genital tract. Andrew and Miller have reported non-venereal transmission in four heifers, which were added to an infected herd, without contacting the bull. They suggested the possibility of transmission of the infection by tail switching, lying on urine soaked ground, or by brushes used in grooming. Morgan (1942) established the fact that the housefly can carry live trichomonads in its digestive tract for periods varying from two to seventeen hours and thus may be a vector of the disease. However, under herd conditions the disease is spread largely through coitus, and any other method of transmission is incidental.

Description of the Disease

In the female, following coitus with an infected bull, the organisms first grow and reproduce in the vagina, resulting in excessive mucous secretion and the appearance of pus coming from the vulva and matting of the hairs extending from the lower commisure. The vaginal infection is of short duration reaching its peak in 14 to 21 days. This is followed by uterine infection, resulting in endometritis, which may prevent conception, and cause irregularity of the estrus cycle.

The common herd history is that cows, after being bred, pass over one or two heat periods before again coming in heat. In some cases where conception occurs, the subsequent endometritis results in death of the fetus *in utero* and also pyometra, which may not be discovered until an examination is made be-

*Presented at the annual meeting of the Illinois Veterinary Medical Association, Springfield, Jan. 20-21, 1944.

**College of Veterinary Medicine, Ohio State University.

cause the animal has passed the normal time for parturition or failed to show the external manifestations of approaching parturition. On the other hand some cases result in early abortions of the dead fetus, followed by a disappearance of the infection and restored fecundity. In cases where the fetus has undergone considerable maceration, the organism can be found in large numbers in the fluids expelled at the time of abortion. On the other hand, where the fetus is expelled before maceration occurs, it is very difficult to demonstrate the organisms, indicating that the maceration of the fetus favorably influences the media to stimulate the growth and development of the organisms.

In the early stages of infection in the bull, some have described small nodular lesions on the penis and prepuce with a disinclination to serve. However, the disease soon becomes chronic and in this stage there are no clinical manifestations.

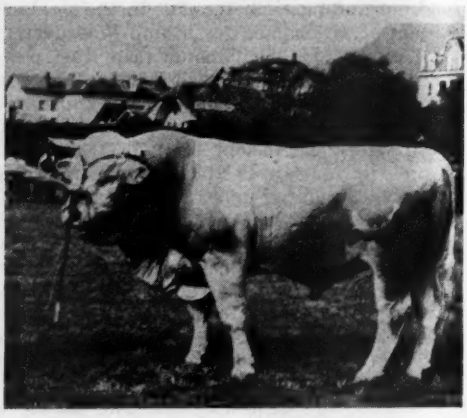
There are indications that at least some females develop a tolerance or immunity to the disease and after a time conceive and produce normal living young, even though bred to an infected bull. In the light of our present knowledge, infection in the bull is permanent.

Diagnosis

Positive diagnosis involves the demonstration of the living parasites under the microscope. Where trichomonad infection is suspected in a herd, washings or secretions from the vagina, taken from the depression just below the cervix, about 14 to 21 days after a female has been bred are most apt to contain the live organisms. For this purpose a long glass, or metal inseminating tube, is attached to a 5cc or 10cc syringe. This is passed through a speculum which has been inserted into the vagina, and 5cc of physiological saline solution is sprayed against the cervix. This solution is then drawn back into the syringe and examined for trichomonads.

Since the organisms live but a short time outside the body of the host and are difficult to detect when not actively motile, the microscopic examinations should be made on the premises. The ordinary 16mm objective and reduced lighting should be used for the examination. In suspected herds several females may have to be examined before a positive diagnosis can be established, since after the infection leaves the vagina and becomes established in the uterus, vaginal swabs and washings are usually negative. For that reason there is no accurate way of determining the number of females affected in a herd nor when it is safe to use a clean bull in the herd.

As a result of some recent work we have been doing, we feel that herd infection can be more readily established by examining the bull or bulls used in the herd. Most investigators of trichonomiasis say that the diagnosis of infection in the bull is very unsatisfactory. However, in three bulls which we have examined once or twice weekly for over a year, we have never failed to recover the organisms, and the number of organisms recovered per slide have been quite constant. In collecting the material the bull is snubbed by the nose then, using an ordinary gate, the animal is crowded tightly against the side of the stall and irrigation of the sheath is carried on through the gate. This insures safety



The prognosis of an infected bull is unfavorable. It is doubtful if he ever recovers from the infection

to the operator. For the irrigation, a soft rubber catheter about 18 inches long and ¼ inch in diameter (outside) is inserted into the sheath. About one and one-half ounces of sterile physiological saline is injected by means of a rubber bulb syringe. During the injection, the prepuce is held tightly closed around the catheter and the sheath massaged vigorously. The fluid is then siphoned off into a receptacle and examined for the organisms. A very important part of this technic is the application of vigorous massage to the sheath while it contains the irrigating fluid. As an aid to diagnosis in the bull, we have also found, in the course of some experimental work, that the numbers of organisms recovered by irrigation can be increased greatly by administering phenothiazine, *per os*, for three or four days prior to irrigation. On each of the three bulls on several occasions the number of organsims increased from a normal of 6 to 12 per slide to from 40 to 100 per slide after four daily doses of 50gm phenothiazine. However, after a week or more of phenothiazine treatment the organisms decreased in number.

Prognosis and Treatment

It is generally agreed that the prognosis for infected females is favorable, while that for infected males is unfavorable. The infected herds will generally return to normal breeding efficiency if given a few months of sexual rest and then artificial insemination is practiced using a clean sire. Some authorities favor irrigation of the uterus with antiseptic solutions to hasten the elimination of the infection, while others doubt the value of irrigation.

It is doubtful that the infected male ever recovers from the infection. Three bulls under our observation for more than a year are known to have been infected for from one to three years with no signs of clearing up and having had no chance of being re-infected for at least one and one-half years. Treatment of the male, in so far as we know, is of no value. Irrigation of the sheath is advocated by some while others recommend casting the bull, relaxing the penis with epidural, and massaging antiseptic ointments of various kinds into the penis and sheath. It is our opinion that apparent good results from this treatment were only temporary. We have had bulls clear up for as long as twelve weeks, only to have the infection suddenly recur.

That infected bulls can be used safely for artificial insemination, has been claimed. This would no doubt greatly minimize the danger; however, there is not sufficient experimental data to warrant a statement of absolute safety. Thus, in the light of our present knowledge, where infection is diagnosed in the bull, the only absolutely safe procedure is to discard the animal for breeding purposes. This represents a rather serious loss to the owner in many instances, since some of these infected bulls are valuable proved sires. It is hoped that some way will be found to either eliminate this infection from bulls, or that some method may be discovered whereby their breeding services can be maintained with safety.

★★★ BUY WAR BONDS ★★★
AND HOLD THEM

Bang (Bernhard) reports he has isolated avian tubercle bacilli from a rabbit and Weber and Befinger have demonstrated avian tuberculosis in a hog. Bearing these facts in mind one must conclude that tuberculosis of poultry constitutes a danger for other domestic animals.—*Vet. Med.* 7:11, p. 499, 1912.

"Bearing these facts in mind," when bovine tuberculosis eradication was planned several years later, would have saved some embarrassment, when the success of that project failed to signalize also the eradication of tuberculosis from swine.

Artificial Insemination

When artificial insemination first came into practical use in New York state along about 1938, one service from a bull was considered sufficient to breed about 10 cows—however it was necessary that this semen be used within 24 hours.

Recent experiments at the state college have shown that semen can be diluted to one part in 17 and that one service can be used to breed 80 or more cows.

At present semen, if kept at a temperature of about 40°F., remains fertile for a number of days and can be shipped long distances. This makes possible its use on numerous farms, many of which would find the cost of service or ownership of a valuable proved sire prohibitive.

Fluid Milk Consumption Increasing

As family incomes have risen, consumption of fluid milk has mounted the country over; increasing from 32 billion pounds a year in the 1935-39 period to 41 billion pounds last year, and an even greater quantity would have been used had a better system of distribution obtained. For example, millions of pounds of evaporated and reconstituted milk were consumed by the armed services in this country because of the difficulty of distributing fresh milk to stations located in districts where insufficient milk was produced to supply them.

Less butter was produced in 1943 than in 1942, and of that produced 85% went to civilians and 15% to the armed forces and lend-lease and regular export.

Milk Goes to War

Milk is our most important war-time food and the dairy cow is our most important farm animal. She is the most efficient converter of feed to food. Never before has milk gone to war in such tremendous quantities. Last year milk production exceeded that for any year in the first World War by 60%. It goes in planes and submarines, it is dropped by parachute in tropical jungles, is dumped on beaches and stacked in deserts. Better use is being made of milk than ever before. Last year 63% of the non-fat solids was used for human food; before the war only 54% was so used. Last year our civilian population consumed 405 pounds of fluid milk per capita. The pre-war figure was 342 pounds. The goal for this year's milk production is stupendous—121 billion pounds. This is 2½% more than the 1943 milk production. But even that will not be enough. It is estimated 140 billion pounds would be required to supply all demands.

Comparative Value of Cooked and Uncooked Foods for the Growth and Development of Cats

NUTRITIONAL studies of the requirements of cats, for proper growth and development, have been undertaken by comparatively few investigators. Pottenger in 1941 completed a three year study of the effect of raw and cooked foods upon this animal. The mother cats were placed on special foods four to six months prior to breeding. The diet of one group consisted of raw meat and dry feed with raw milk; the diet of the other group consisted of cooked meat, and dry feed with raw milk. Other studies have shown that the properties of dry feed raw milk are similar to those of pasturized milk. Both groups were given a liberal amount of cod-liver oil to insure adequate vitamins A and D.

All of the cats used in the Pottenger experiment were kept in large outdoor pens. The sides and tops of the pens were screened with chicken wire only, so that the cats had the benefit of the available sunshine. Each pen was divided into two sections—a yard four by twelve feet long with a seven foot ceiling and a roofed enclosure six feet square with a six foot ceiling, wooden floor and bedding. The floor of the yard was bare earth covered with fine sand.

During the three-year period, 63 viable kittens were born of parents fed raw food, their average weight at birth was 119gm. Forty-seven kittens were born of parents fed cooked food. Their average weight at birth was 100gm. There were four dead kittens born in the raw-food group and 16 in the cooked-food group. An example of the effect of the heat labile factor of the diet of the matron upon the birth weight of the offspring is the following: Cat No. 1, fed a cooked-food diet produced a litter of four kittens of an average weight of 77gm. She was then placed on a raw-food diet and her litter for the next year consisted of five kittens with an average birth weight of 116gm; while the following year (still on a raw-food diet) the litter consisted of three kittens with an average weight of 137gm. The opposite result may be produced by taking a matron that has been on raw food and placing her on cooked food. Cat No. 4, given a cooked-food diet, produced a litter of five kittens, with an average weight of 105gm, and the following year a litter of six with an average weight of 91gm. If the dam is kept on cooked food for more than two years, she usually dies during parturition.

The cats fed cooked food occasionally produced premature litters or full-term stillborn litters. In several instances in this experiment, females on a cooked-food diet died during delivery. One cat was unable to deliver her kittens even though in labor for 72 hours. Delivery complications such as these were not encountered in the cats on a raw-food diet.

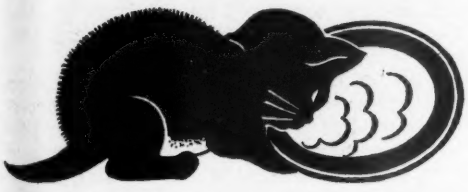
Cats on the cooked-food diet were of a much more nervous disposition; they were not friendly, they paced their pens, were often quite vicious and were smaller in build. Though the bones of their legs were smaller in diameter, their bodies were frequently longer and the fur much poorer than that of cats fed raw foods. Muscle tone and visceral development of those fed raw meat was much greater than were those fed cooked meat.

One of the earliest defects noticed in cats fed cooked food, was poor and retarded dental development. Moreover when the permanent incisors displaced the temporary ones, these same animals, instead of the usual six, developed three or four irregularly spaced, uneven, crowded incisors in both the upper and lower jaws. Although a few such accidents sometimes happened, on the raw-food diet it occurred from three to four times as frequently in the cats on the cooked-food diet. This condition become even more pronounced in the second and third generation on the cooked-food regime.

Femurs of animals were removed and the entire bone analyzed for its calcium and phosphorus content. The kittens, both of the mother cats that had been fed raw food and those that received cooked food, had approximately the same amount of calcium and phosphorus at birth; quite often this was within two or 3% of that found in the femur of the mother. After the first two weeks a marked depletion of the calcium and phosphorus of the bone occurred. This no doubt corresponds with the period of greatest growth. Two months later the bones of the kittens on the raw-food ration were gradually approaching normal in respect to these salts while those of the kittens on the cooked-meat

ration lagged behind. This effect was still more pronounced in the second and third generations; that is, the bones of second and third generation kittens given cooked food were markedly deficient in calcium and phosphorus, after they reached adult life. Corresponding litters of kittens fed raw food had from two to three times as much calcium and phosphorus in their bones. If the first, second, and third generations were kept on a cooked-food diet, the third generation kittens were in such poor condition that they lived, at the longest only two months. Experiments beyond the third generation on the cooked-food diet could not be made because no cats survived beyond that time.

Experience has shown that once a deficiency is produced in kittens it cannot be reversed



even under intense therapy. A well-developed adult cat can be maintained in a healthy state on deficient diets, if thyroid and adrenal hormones are included in the dietary. A deficient kitten, however, even if placed upon raw food, thyroid and adrenal hormones, does not become a normal cat.

If a mother cat has been on a cooked-diet from 12 to 18 months, it takes at least three years on a raw-food diet before her kittens approach normal.

A complete post-mortem examination was made upon cats that died. A study of microscopic sections of the lungs of second and third generations showed that cooked food was responsible for the production of certain respiratory conditions. The lungs of these cats showed hyperemia, some edema and partial atelectasis, while those most deficient showed bronchitis and pneumonitis. The kittens fed raw food had normal lungs, although occasionally a cat was found with lungs that showed a mild hyperemia.

Five of the cats given cooked food showed suppurative inflammation of the thigh. Smears of the pus showed the presence of streptococci and staphylococci. The femurs were fragile and showed marked osteoporosis, with marked thinning of the cortex. In two of these five cats the bone had been partially disintegrated and only chips and fragments remained.

In several cases a hypothyroid condition was found among cats fed cooked food. The thyroids showed scanty colloid and the acini were small. This was not observed in the thyroids of cats given raw food.

The ovaries of the cats fed cooked food showed, as a rule, only a few developing follicles and primordial ova, while those cats fed raw food showed active oogenesis with normal and large numbers of developing follicles. In males the testes of the cats fed cooked food showed a lessened number of spermatozoa and many of them showed an absence of speratozoa but with active spermatogonia. Cats fed raw food showed active spermatogenesis.—*H. J. Mostyn.*

Cat Facts*

Sweating does not become visible in cats.

Tuberculosis in cats is not rare, especially in the larger cities.

Hemorrhage is almost always negligible in amputations in the cat.

The cat is said to be over 2000 times more resistant to tetanus toxin than the horse.

The domestic cat is host to about as many species of flukes as of tapeworm and roundworm species combined.

Cats which are entirely white and have blue eyes are generally deaf.—*Darwin* "The Origin of Species."

Cats become infected with herpes tonsurans very easily. Quite often they acquire the infection from contact with human beings.

A healthy cat rarely makes an unprovoked attack upon a human being; should this happen, strong suspicion of rabies is justified.

Ear mange is poorly tolerated by cats. Fatal cases are frequent. In neglected cases the mites are prone to burden through the tympanum, eventually setting up a fatal meningitis.

The duration of estrum in the cat is one to three weeks; it occurs twice yearly as a rule if she is bred and suckles her young, but may recur in one to three weeks if the cat is not impregnated.—*Banham.*

Notwithstanding cats are usually careful to examine their food and to pick it over before eating it, they quite often swallow foreign bodies, usually in the course of play. One of the most common objects swallowed is a threaded needle.

*Feline Practice, *Veterinary Magazine Corporation.*

Veterinary Practice in Montana

By W. J. BUTLER*
Helena, Montana

MONTANA is a country of wide open spaces and as the cowboys say "it is all outdoors," which simply means that our towns are far apart and in some sections even our ranches are quite some distance from one another. Montana covers an area of 147,000 square miles. We have a population of around 500,000. During the summer months we have approximately 8,500,000 cattle and sheep—counting our calf and lamb crop.

In the larger towns, which are generally adjacent to some irrigated section, a veterinary practitioner can make a reasonably good living. In these areas practice generally consists of large animal practice along with small animal practice. In the outlying districts a veterinarian, dependent upon the income from practice alone, finds it rather difficult to establish a paying practice.

In order to provide veterinary service throughout the State, the Montana Livestock Sanitary Board has divided the State into 12 districts. A full-time, regularly employed veterinarian is placed in charge of each district and is designated a District Deputy State Veterinary Surgeon. It is the duty of a district deputy to investigate immediately any reported outbreak of a dangerous disease in livestock or poultry, to supervise fluid milk production, to see that the orders and regulations of the Montana Livestock Sanitary Board are observed, and to keep in touch with the livestock situation so that he is conversant with livestock conditions in his district.

District Deputy State Veterinary Surgeons are permitted to practice, when a practicing veterinarian is not reasonably available and when such practice does not interfere with his official duties. Districts are too large for a single veterinarian to render adequate veterinary service. Therefore, it is the policy of the Montana Livestock Sanitary Board to commission all licensed graduate veterinarians as Resident Deputy State Veterinary Surgeons. This commission carries authority for such veterinarians to make interstate inspection of livestock and gives them the same authority as district deputies when commissioned to do regulatory work by the State Veterinary Surgeon acting for the Montana Livestock Sanitary Board. Each resident deputy state veterinary surgeon is budgeted a certain amount of money each year, the amount depending upon the territory he serves and the scope of work which he is commissioned to perform. In order to avoid excessive travel and to prevent duplication of work, a limited area is assigned to established practicing veterinarians, who are commissioned as resident deputy state veterinary surgeons and within that area they assume and perform duties of a district deputy. The district deputy, however, is in charge of the entire district and if the resident deputy discovers a condition which he considers exceptionally dangerous he is required to report that condition immediately to the State Veterinary Surgeon and to the district deputy. If an outbreak of disease requires the assignment of a number of veterinarians to a definite area the district deputy in charge of that district is in charge of the investigation, unless the Chief Deputy State Veterinary Surgeon is assigned to assume control.

Resident deputies are paid on a *per diem* basis. They receive $10.00 per day plus necessary subsistence and travel expense. For personal auto hire they receive five cents per mile.

In outlying districts where it would be difficult for a veterinarian to build up a paying practice immediately it is the policy of the Montana Livestock Sanitary Board, as finances permit, to commission a competent veterinarian who locates in an outlying district as a deputy and assign him a limited area and to pay him for his services in supervising and carrying on the work of the Montana Livestock Sanitary Board in that area on a definite retainer fee rather than on a *per diem* basis. Usually a young veterinarian in a new location likes to know how much money he will receive from the state each month and so a definite retainer fee not only helps him but, in the main, saves money for the Montana Livestock Sanitary Board. The retainer fee that is paid to such deputies varies from $50 to $100 per month with necessary subsistence and travel expense when away from their official stations. Naturally the veterinarian must perform sufficient official duties to warrant his retainer fee and very naturally he is required to work cooperatively with the district deputy in whose district he is located. Such deputies are permitted to practice without restriction.

The Montana Livestock Sanitary Board also employs a state-wide dairy inspector whose duty it is to correlate the work of district and resident deputy state veterinary surgeons in dairy inspection and supervision of fluid milk production and distribution throughout the State, which control makes for uniformity in work pertaining to the dairy industry.

The Montana Livestock Sanitary Board

*State Veterinary Surgeon.

budgets out for each fiscal year the amount of money that may be spent by any district or resident deputy or by the laboratory or office personnel. This budget is flexible but no deputy or employee may exceed his budget allowance in any one month by more than $25 and may not exceed his budget allowance for the year by any amount unless upon specific authorization from the State Veterinary Surgeon. Each deputy is required to render a weekly report detailing work performed, ranches visited and speedometer readings of personal auto mileage for each official trip. In this way an accurate check is kept on expenditures and work performed.

Naturally the scope of work to be performed and the amount of veterinary service rendered is determined greatly by the sum of money appropriated to the Montana Livestock Sanitary Board by the legislative assembly.

It is the policy of the State Veterinary Surgeon to issue a monthly letter which goes to every veterinarian in the State. This letter gives a brief summary of disease conditions reported during the previous month and outlines any new method for control, treatment and prevention of disease conditions that have been diagnosed or which reasonably may be expected to make their appearance. In this way each veterinarian in the State is kept conversant with livestock conditions throughout the entire State.

Each veterinarian is also furnished a pamphlet containing the livestock sanitary laws of Montana, all of the rules, regulations and orders of the Montana Livestock Sanitary Board together with opinions of the Attorney General pertaining to the livestock industry. They also are furnished a loose-leaf binder completely annotated in which to file letters of instructions. They also are furnished with an inexpensive filing system with suggested instructions for a definite method of filing.

Under the laws of Montana and by direct authorization from the Montana Livestock Sanitary Board the executive officer of the Board is State Veterinary Surgeon and when the Board is not in session he is authorized to perform all of the duties imposed by law on the Board and is authorized to issue such regulations, instructions and orders as he may consider necessary for the protection of the livestock and poultry industries of Montana, and to issue such instructions to any and all employees which he consider necessary. Such a provision permits immediate action to be taken and provides for flexibility of action and scope of work. In order, however, that such authority shall not get out of control, the law provides that any order or regulation promulgated by the State Veterinary Surgeon shall be subject to review, modification or annulment by the Board at any meeting. The Board appoints, determines the tenure of office and designates the salary of its executive officer and deputies. The Board meets on an average of four times a year.

The Montana Livestock Sanitary Board maintains chemical, pathological and bacteriological diagnostic laboratories to which laboratory tissues, blood samples and materials may be sent by any veterinarian for chemical, bacteriological or pathological examination. The Board also cooperates with and helps to maintain a veterinary research laboratory at the State Experiment Station.

This past year the cost to the State for the operations of the Montana Livestock Sanitary Board including indemnity for animals destroyed as a sanitary safeguard, also the control and eradication of dangerous diseases of livestock and poultry, supervision of fluid milk production and distribution in the entire State, together with stallion registration, was less than one cent per year per animal, if we take the summer count of our livestock as a basis. If we compute the operating costs of the Montana Livestock Sanitary Board from a livestock valuation standpoint, then the cost of operating the department was less than one-tenth of a cent per animal per year. As will be realized from these figures the amount appropriated for disease control and operation of the Montana Livestock Sanitary Board is not sufficient to provide adequate veterinary service in all sections of the State. Inadequate finances make it impossible for the Board to have veterinarians locate in many districts where veterinary service is needed.

Unfortunately it is a human failing not to adequately appraise needed protection. There is no better illustration of this human failing than the appalling lack of foresight on the part of this country in not providing protection against war. If we had been properly prepared the catastrophe that occurred at Pearl Harbor on December 7, 1941, would never have occurred. Our lack of preparedness will cost hundreds of thousands of lives and untold billions of dollars.

It would seem that some calamity has to happen, before we are willing to appraise the value of any particular work that provides for the prevention of disease or war. It would seem the better part of wisdom, insofar as livestock disease control work is concerned, to spend a little more money for prevention and get ahead of disease by proper veterinary research and the practical application of research findings to control work, rather than to trail along and endeavor to control and eradicate disease conditions which might have

been prevented from making their appearance.

No matter what system may be adopted by any state the net results, good or bad, depend to a very great extent upon the professional ability and personality of the practitioner or individual veterinarian.

If he organizes his work and renders an efficient service then veterinary service in that district is highly respected and becomes more in demand each year. Adequate veterinary service requires follow-up work just as truly as a correct initial diagnosis of a disease condition is required. In fact, it may be stated very definitely that no disease control service is adequate unless follow-up work is an invariable practice and adequate follow-up work demands trained veterinary personnel.

Hormones*

Hormones are difficult to distinguish from other chemical substances such as vitamins needed in minute amounts in the body.

Not all hormones are produced exclusively in the animal body. Estrogen, for example, is present in green plants. It is not known whether it is present in such plants in sufficient quantity to affect animals feeding upon the plants, but there is a widespread popular belief that horses and cattle at pasture breed better than those that have long been on dry feed. Many in the rabbit industry believe this animal will, in time, cease to breed if it is not supplied green stuff in its feed. This effect of green feed on the reproductive functions of certain herbivorous animals may or may not be due, in part, to the estrogen content of the green feedstuff.

Not all hormones are destroyed in the digestive tract, if ingested, but many are.

Both hormones and vitamins have a great range of chemical composition. Estrogen and vitamin D are much alike chemically and there is a similarity in some of their effects. For example both are concerned with calcium metabolism.

We don't know how hormones act. About the way in which vitamins act, we know a little more. Some vitamins at least are catalysts.

The thyroid gland is primarily concerned with regulating basal metabolism. It also stimulates milk secretion. Thyroxine, the hormone secreted by this gland, is a crystalline iodine compound which can be made synthetically. When it is administered to an animal, its action is similar to that of desiccated thyroid. A preparation made by combining iodine and casein has a biological activity similar to thyroxin and will also increase the milk yield in cows in the latter part of lactation.

Parathyroid hormone, like vitamin D, is concerned with calcium metabolisms. It mobilizes the calcium stored in the skeleton for use elsewhere in the body. There is four times as much calcium in 30 pounds of milk as there is in all the blood in the body of a cow, yet this amount of calcium can be taken from the blood, within a few hours without lowering the calcium level in the blood, providing the parathyroid glands are functioning properly. Milk fever is very likely the result of an upset in the parathyroid mechanism. Sufficient intake of vitamin D may compensate, in part; for inadequate functioning of the parathyroids in some breeds of cattle. At the Ohio Agricultural Experiment Station, increasing the intake of vitamin D, decreased the incidence of milk fever 50% in Jersey cows, but had no effect on Holstein cows.

The posterior lobe of the pituitary body elaborates two important hormones, pitressin and oxytocin. The latter has been much discussed recently because of its action in causing a cow to "let down" her milk. It is produced quickly and destroyed quickly. This explains why its secretion should not be excited more than three or four minutes before milking is to begin and why milking, once commenced, should be completed promptly.

The anterior lobe of the pituitary secretes a host of hormone substances including the growth hormone, the lactogenic hormone, the gonadotropic hormones and others, all differing chemically and biologically. It is worth noting that while the male sex hormone will increase libido no hormone is known which will increase spermatogenesis in most types of aspermia in the male. The case is different with the female in which gonadotropin will frequently induce estrus and ovulation. Ninety-six cows and heifers with cystic ovaries were treated at the Wisconsin Agricultural Experiment Station with a crude pituitary preparation and in 81 of these animals showing nymphomania, the symptoms disappeared within 3 days. Of 52, which were bred after the gonadotropin was administered, 35 conceived.

Gonadotropic hormone will cause a sow to come in heat at any time after the 35th day of lactation.

Diethylstilbestrol is an artificial or synthetic estrogen. Strangely, when given to birds in minute doses, it more than doubles the deposition of fat in the muscles. The dose required is so small that the expense is merely nominal and it is thought this use of stilbestrol may have commercial possibilities.

*Notes from a discussion by Professor H. H. Cole at the California Veterinary Conference, San Luis Obispo, Jan. 4-6, 1944.

Clinical Reports

Were These Cases Hypopituitarism?

Recently I was called to the farm of a client who had a sow that had farrowed four days previously and a Holstein cow that had calved one day earlier.

The etiological supposition is that the pituitary body had functioned so much during pregnancy, producing prolactin, that insufficient secretion remained to stimulate milk production following parturition. The clinical symptoms of the two cases were very different with the exception that both exhibited agalactia.

Examination of the mammary glands of the sow showed them to be severely swollen, hot and painful. There was diffuse redness about the glands and no secretion of milk. The patient manifested constipation, stiffness in all joints, anorexia and a temperature of 107° F.

The owner reported that the sow was reluctant to rise in spite of the fact that she farrowed without difficulty. She lay in ventral recumbency and refused to let the pigs suckle. Although 10 pigs had been farrowed normally, three were already dead, when I arrived and the remainder of the litter looked gaunt and squealed as though hungry.

The following therapy was very effective for the sow and pigs. Each pig was given 10cc of 25% dextrose solution intraperitoneally and the dose repeated in 24 hours. The sow received 5cc of anterior pituitary extract subcutaneously. Within 12 hours the secretion of milk had returned and the pigs were strong enough to nurse. One pint of Carron oil was given *per os* to the sow followed by an enema of warm water to ameliorate the constipation. The owner was given instructions to bathe the udder in warm water frequently, in order to relieve the inflammation.

The owner reported that the cow which had freshened five days previously had given a small amount of milk immediately after parturition, which the calf was permitted to nurse. Then the calf was removed and during the next 24 hours no milk could be secured. On the second day the calf was again placed with the cow but it was unable to obtain any milk. At the time of my arrival the calf was still by the cow's side but had been bucket fed, due to its inability to obtain milk from its mother. The udder at this time had lost nearly all the congestion that normally follows parturition. Its size had decreased considerably and it was very flabby. No heat or redness was noticeable nor other clinical symptoms seen. The temperature was 102° F. She was eating normally and was able to get about in the usual manner. The cow had an eutocia producing a large, vigorous calf.

Again a tentative diagnosis of hypopituitarism was made and an injection of 10cc pituitary extract (anterior pituitary lobe) was given subcutaneously. This was repeated each day for three days. At the end of the third day the milk flow had increased to one gallon per day and in two weeks the cow was back to normal production. No further treatment was given.

The fact that both cases responded to the administration of pituitary extract makes it appear that the etiology was hypopituitarism. However, due to the extreme complexity of the hormones of the anterior pituitary and their interrelationship with the other endocrine secretions one cannot be sure of this diagnosis without exhaustive laboratory procedures.

LEO J. GARVERT

Plainville, Kansas

Traumatic Gastritis in a Horse

October 25, 1943, an eight-year-old black, grade Percheron mare was presented for treatment. The animal had a history of having become progressively thinner over a period of about a month. The mare maintained a good appetite and consumed normal amounts of water but she was somewhat emaciated and when exercised respiration was rather jerky but returned to normal after rest. Her temperature was 105° F. and a blood count of 19,000 W. B. C. with 93% segmenters, and 4,000,000 R. B. C. Strongyle eggs were found on fecal examination.

Phenothiazine was given (35gm) *per os* and recommendations were made that the animal be given more and better feed than previously.

Three weeks later a call was made to the farm to treat this animal. She had become extremely emaciated and walked with a wobbly, unsteady gait; had a temperature of 105° F., was markedly anemic and stood with a "tucked in" abdomen. The animal appeared very dull with sunken eyes and rough hair coat. Rectal examination failed to reveal any abnormality. A tentative diagnosis of an abscess in the abdominal cavity was made. No treatment was given.

The animal died that night and necropsy revealed a tremendously enlarged spleen (17 inches long, six inches wide by five inches thick) which contained a collection of multiple abscesses. A piece of wire five inches long had passed through the stomach wall, leaving an ulcer two inches in diameter; through the liver, leaving an area of ab-

scesses; through the diaphragm, leaving an ulcerated area; and into the spleen where it had become lodged. Extensive adhesions had developed between the stomach, liver, diaphragm and spleen. Pyelonephritis of both kidneys was present, but there was no further evidence of spread of the infection to other organs of the body.

Apparently traumatic gastritis is uncommon in the horse and mule, but this and other reports in the literature show that it sometimes occurs.

ROBERT CAMPBELL

Asheville, N. Car.

Large Foreign Object in Abdominal Cavity of a Fox Terrier

A six-year-old Boston terrier was presented at the small animal clinic of the Panhandle Veterinary Hospital, Amarillo, Texas, January 13, 1944, to be spayed and to have a fistulous tract, that had developed on her right side near the angle of the last rib, examined.

The anesthetized dog was secured in left lateral recumbency on the operating table, and the region around the fistulous tract was shaved and disinfected with tincture of iodine. Palpation and examination of the fistulous tract with a flexible probe revealed what seemed to be a greatly enlarged and encapsulated 13th rib.

An incision was made downward about two inches along the fistulous tract. This allowed a more thorough examination and revealed that the object extended into the abdominal cavity—by this time we were getting pretty curious as to what we were going to find.

The ventral abdominal area was then shaved and disinfected and a two inch midline incision was made into the abdominal cavity. Exploration of the abdominal cavity revealed much inter-intestinal adhesion with none to the peritoneum at the end of the capsule; it was also noted that the peritoneum adhered closely to the thick capsule, separating it from the viscera. It was here that we discovered that the object was much longer than a rib. The lateral incision was then made longer and through the muscles of the back and side. This brought to our sight a large black object which was removed with considerable tension. The dog was not spayed and the midline incision was closed with interrupted sutures. The back and side incision was impregnated with a sulfa drug powder and likewise sutured, leaving a small opening at the lower end for drainage. The owner later identified the object removed from the dog as the handle of her vaccum cleaner that was broken and discarded about a year ago. The handle was solid hard composition rubber. It was 4½ inches long, 4 inches in circumference at one end, and 3¾ inches at the other. It weighed four ounces.

History of the case: The owner reported that they had raised the dog since she was a pup and that she had been kept inside all of

Handle of vacuum cleaner removed from side of Boston terrier

the time. She recalled, however, that about a year ago the dog was away for a day and came home with a small wound over the region from which the object was taken but that it healed quickly under home treatment. She also reported that the dog had been treated, for abscesses in the area, twice recently by

Tape shows location of vacuum cleaner handle in side of Boston terrier

another veterinarian who found no apparent cause for the disturbance.

It is not unusual for small foreign objects to be taken from dogs, either internally or from the muscular tissue. We appreciate the fact that it would be possible for the dog to live after an object so large was in place and thoroughly escapsulated.

Considering the position of the handle in the dog at the time of operation with the blunt end forward, a blow hard enough to

pass it through the skin and muscle near the spinal column would have certainly meant serious injury. To assume that a Boston terrier could swallow an object so large is out of the question, but granting that the dog could have swallowed the object, it would have had to penetrate the bowel and peritoneum and so large an opening would not have healed. We are calling it a believe it or not and letting you use your imagination.

E. F. LANHAM and R. B. COFFMAN

Amarillo, Texas

Mistaken Identity

Things happen in veterinary practice occasionally which are both amusing and exciting and keep a general practitioner's life from becoming too dull. An unusual experience of mine in practice, while of no scientific interest I shall not forget.

Awakened by the ringing of the telephone about two o'clock one cold morning in January, I picked up the receiver. "Doc.?" "Yes," I answered. "I need you bad," a scared voice cried, "I'll be waiting for you at the Cerelity school." This was eight miles south of town. Rural phone service is seldom good, but when questioned about the nature of the call he said something about a "confinement case." Knowing country boys, I thought nothing of the reference to distocia in this manner and told him that I would be there in 15 minutes. I stopped at the appointed place and picked up a cold and scared young man about 20 years of age. He placed his lantern on the floor of the car and said "Turn down this next lane to the right." I did as directed and asked him whether it was a mare or a cow. "Hell! no," he exclaimed, "It's my wife." I stopped, backed up, and drove down the road to the farm from which he had telephoned and we got the old man out of bed again. By this time the boy was so scared that I had to talk for him. I gave the operator the number of a local physician and she rang my telephone just as she had done when the young man had called earlier. My wife answered. I finally reached the doctor and with some difficulty made him understand that this woman whom he had seen previously, was in labor and needed his assistance. I returned home and to bed; but the doctor didn't arrive until three hours later.

Of course, the incident caused quite a bit of amused comment in the community. The most interesting part of it to me was the frequency of the statement that "while the veterinarian was there in 15 minutes, it took the M. D. three hours to get there."

G. W. BAYLES

Marion, Ill.

Cattle Practice*

The treatment of diseases of the bovine reproductive system is being neglected by many veterinarians to the detriment of their practices and to the disadvantage of cattle owners. It is somewhat of a specialized field but any practitioner can do much for his clients that will pay good dividends. Little special equipment is needed—cervical forceps, an irrigation apparatus (a fountain syringe is satisfactory), two rubber catheters, a rubber apron, surgeon's rubber gloves and long obstetrical sleeves. Preparation of the animal for this work is important but all are familiar with the procedure.

Diagnosis of Pregnancy

The first requisite in the treatment of the reproductive organs of cows is the ability to diagnose pregnancy. Cows that fail to come in heat after breeding usually are assumed by the owner to be pregnant, but such is not

always the case. Most of the examination for pregnancy is made by rectal palpation of the uterus, uterine artery, cervix and ovaries. A correct diagnosis that is made 40 to 90 days after breeding is good enough.

In non-pregnant animals and in those pregnant less than 90 days, the uterus lies wholly within the pelvis and the arm needs to be inserted into the rectum but halfway to the elbow to palpate it. If, in beginning this work, one does not recognize the uterus the forceps may be clamped onto the cervix and the organ slightly retracted. In this way the uterus can be identified readily.

The tone of the gravid uterus is different from that of the non-gravid organ. Tone is hard to describe but is easily recognizable. At this stage, if the animal is pregnant, one horn of the uterus is larger than the other. Also, at this time, the fetal membranes can be felt by

*Notes from an address at the 13th Annual Conference for the Louisiana Veterinary Association conducted by Louisiana State University and A. & M. College, Feb. 16-17, 1944.

grasping the wall of the uterus and allowing it to slip between the thumb and fingers. There is a sort of double slip if the animal is pregnant. The first when the chorion escapes from the fingers and the second when the uterine wall escapes. At the 10th to 12th week of gestation a swishing pulse can be felt in the middle uterine artery. In the absence of estrum this pulsation is a good, but not an infallible, sign of pregnancy. It sometimes, but rarely, occurs in cases of retained placenta. It is not present in pyometra, where otherwise the size and weight of the uterus might mislead one. Lack of tone in the uterus is another factor in determining pyometra.

A mummified fetus is hard to diagnose while there is much fluid in the uterus. Later, however, when the uterus has contracted onto the fetus it is easily recognizable.

Eversion of the Uterus

Eversion of the uterus is always an emergency case. Get to such a case as soon as possible; use epidural anesthesia, replace carefully and, as far as possible, smooth out any folds in the replaced organ. If sutures are used to prevent re-eversion place them two inches back from the cleft of the vulva. Don't put them through the mucous membrane. To do so invites straining when the effects of the anesthesia have passed off. The sutures should remain *in situ* for a week or 10 days.

In eversion of the uterus, use epidural anesthesia

Teat Surgery

In the removal of obstructions in the teat canal (spiders) the incision should be made through the side of the teat. Local or epidural anesthesia should be employed. The operation should be performed as aseptically as possible. Make an incision one-half inch long right over the obstruction; remove it and suture with fine silk. Insert a Boen type milking tube at each milking for several days to a week. If there is no staphylococcus infection in the udder the results are generally good, otherwise healing usually is retarded.

Sterility

Sterility is not a disease but a symptom. Some sterile cows come in heat regularly, some are in heat all the time and some not at all. This estral behavior indicates the source of the trouble.

Some sterility is due to salpingitis. This is not always easy to diagnose but if the fallopian tubes can be felt as large as a lead pencil there can be no question that salpingitis exists and the animal is hopelessly sterile.

In cases of retained placenta it is preferable to wait 36 to 48 hours before removing the membranes manually. After removal of the secundines, capsules are preferred to douches for medication of the uterus. Mineral oil in which sufficient sodium iodide and iodine crystals (one gram of each to the gallon) have been dissolved to give it a wine color, is favored by many. Stilbestrol injections sometime give satisfaction.

Dermatoses

Quite a lot of skin disease occurs in cattle in the winter. Ringworm and louse infestation are the most common.

Animals usually recover from ringworm spontaneously when warm weather comes. If it is desired to treat the lesions, two ounces of chloral hydrate, one and one-half ounces of glycerin and tincture of iodine q.s., six ounces, makes a good application. Affected areas should be washed thoroughly with soap and water preliminary to treatment. Care should be observed in treating ringworm since it is readily communicable to man.

Cow pox is frequently encountered. Whitfields ointment is usually the drug of choice. This should be massaged thoroughly on affected parts for several days. Tincture of iodine may also be used.

The pediculicide of choice is rotenone but it is somewhat unavailable now. As a substitute, various preparations, depending a good deal upon the temperature and housing, may be used. Lard and other greasy or oily substances are mortal to lice but when applied over large areas the animals cannot endure cold or hot sunshine. The ordinary lime and sulfur dip, which can be purchased ready prepared, requires only dilution for use, is effective and practical, if the animal be sheltered, as it dries quickly. Most sulfur preparations are effective. Louse eggs may survive almost any treatment and therefore, the treatment should be repeated in 10 to 14 days in order

to kill lice that have hatched after the first application. Clipping is indicated when the weather permits.

Lafayette, Ind. J. F. BULLARD

Diverticulum and Rupture of the Esophagus

December 16, 1943, a six-year-old Hereford cow was presented for treatment. It is because of the presumed rarity of the condition with which the animal was afflicted and because of the seeming ease with which a correct diagnosis of the condition may be missed by the practitioner, the case is deemed worthy of report.

History.—December 14, in the morning, the owner noticed that the cow was sick and did not eat or drink. He also noted a swelling under her left jaw and marked bloating. A veterinarian was called immediately. He removed the excess gas from the rumen with a trocar and prescribed a laxative for the owner to administer at noon. This was given as directed.

December 15, the cow continued obviously sick. She was again bloated and the enlargement under her jaw had extended part of the way down the lower border of the neck. The veterinarian was telephoned and gave instructions to the owner to "tap" the cow for relief of the bloat, which was done.

December 16, the animal still could neither eat nor drink and was markedly ailing. The rumen was bloated as before and the enlargement under the jaw extended most of the way down the lower border of the neck. The veterinarian could not be reached by telephone so late in the afternoon the cow was brought to the clinic.

Symptoms.—The cow exhibited complete anorexia, considerable depression and some dehydration. Her temperature was 102.3°F. She had an enlargement extending from under her left jaw practically the entire length of the ventral portion of the neck. The enlargement was of a doughy, crepitous consistency. The rumen showed marked tympanic dilation. On rectal examination the rumen felt firm and enlarged.

Diagnosis.—No diagnosis was made.

Treatment.—Several unsuccessful attempts were made to pass stomach tubes of various sizes. The passage was always abruptly halted when a tube reached approximately the posterior extremity of the cervical portion of the esophagus.

Because other methods of treatment had failed, it was decided to perform a rumenotomy. The cow was confined in stocks. An area about eight inches in diameter between the last rib and the external angle of the ilium, below the lateral processes of the lumbar vertebrae, was shaved and painted with a 1 to 1000 solution of alcoholic sublimate. About 20cc of a 1% procaine solution was injected into the subcutaneous tissue underlying this area. When anesthesia was complete, a six-inch vertical incision was made through the skin in the central portion of the area. The external and internal oblique muscles were bluntly divided in the direction of their fibers. The peritoneum was then incised. The peritoneal cavity was explored for foreign bodies, tumors, etc., but nothing unusual could be felt. By means of four tapes 18 inches in length, inserted through the wall of the rumen at each side of the skin incision and at the commissures, traction was applied and a portion of the rumen was brought through the laparotomy incision. A vertical incision about six inches in length was made through the wall of the rumen halfway between the anterior and the posterior sutures and the edges of the rumen incision were sutured tightly to the edges of the skin incision with many interrupted sutures.

The contents of the rumen were evacuated manually. The cardiac end of the esophagus was examined as carefully as possible. About one gallon of mixed grains and bran was added to five gallons of water and poured into the rumen through a funnel. Seven ounces of a 1 to 5000 solution of proflavin and two ounces of aromatic spirits of ammonia were placed in the rumen by the same method. Sodium sulfapyridine (450 grains) was dissolved in one pint of water and administered intravenously. The edges of the fistula were dusted with sulfanilamide powder and a cotton plug was placed in the opening. The cow was released from the stocks and made comfortable in a box stall.

The following morning the cow was found dead.

Necropsy Findings.—Upon incising the enlargement along the ventral border of the neck, a diverticulum and rupture were found at the posterior end of the cervical portion of the esophagus. The diverticulum and the tissues surrounding the ruptured area were tightly packed with fibrous food material. An area of gas gangrene extended up through the tissues of the lower region of the neck to the left jaw. This gangrenous area apparently had caused the swelling that the owner and the clinicians had observed. Although no attempt was made to culture or stain the organisms causing the gangrene, it was assumed that they were of the clostridium group.

JAMES A. PORTER

St. Louis, Mo.

Follicular Mange. A Therapeutic Agent Which Warrants a Trial*

A few years ago a client entered my office to discuss a business matter. Within a few minutes of his entry I became uncomfortably aware of a peculiar odor. Knowing the client well, I tactfully ventured to mention the occurrence, and he informed me that he was taking doses of garlic as a medicinal agent. The odor was so marked that it appeared to be escaping from every pore of my client's body.

At that time I was treating two cases of follicular mange and had tried every suggested scientific remedy without success. The thought occurred to me that since it was almost impossible to find a specific external remedy

The demodetic mange mite is easily detected on microscopic examination. Here are five stages of *Demodex folliculorum*, from egg to mature "grub"

which would penetrate the skin and destroy all the parasites in their "hide-outs," why not attack them from the "rear" by giving medicinal doses of this agent until the habitat of the parasites became obnoxious and untenable; in fact, it was quite possible that the odor might lower the morale of the parasites, even destroy them. The following day I commenced treatment of these two cases by administering one-ounce doses of *Saccus allii* t. i. d. After a period of three weeks I noticed a marked improvement and in three months' time all trace of the disease had gone.

Since that date I have treated a number of similar cases with *Saccus allii* (or the extract in capsule form) with the same encouraging results. I recall one case where the entire body, including the head, legs and feet, were in such an advanced state of disease that the case did not warrant even a trial with any form of treatment, but in 12 months the dog had a perfect coat and showed no evidence of the disease. I would be interested to know the results of this treatment if any practitioner feels inclined to give this agent a trial. But practitioners have little time to go into details, etc.; perhaps our research masters could inform us the maximum doses that dogs can tolerate and so shorten the period of administration when treating a case.

*By C. Wentworth Elam, M.R.C.V.S., D.V.H., Liverpool University Veterinary School, in THE VETERINARY JOURNAL, 100:1, p. 17, 1944.

A recent report from Russia is of interest in this connection:

"Apparent support for an old folk-belief that onions, garlic and their strong-scented kin-vegetables are 'good for what ails you' is offered by the reported discovery by Prof. B. P. Tokin of the University of Tomsk, U.S.S.R., that their essential oils contain substances that kill bacteria, protozoa and even larger organisms like yeast cells and the eggs of certain lower animals. Experimental use in hospitals is now being made of these compounds, particularly of onion paste in the treatment of suppurative wounds."

The onion paste is not applied directly to the wound but is contained in the bottom of a glass vessel which is inverted over the wound exposing it, for five or ten minutes, to the vaporization. Although their nature is unknown, these bacteria-killing substances have been named "phytoncides."

Poultry Practice*

In 1942, the value of poultry and their products, including turkeys and eggs, reached the staggering sum of one billion 951 million dollars. The figures for 1943, not yet available, will no doubt exceed two billion dollars.

The estimate of the number of chickens in Illinois according to the U.S.D.A. as of January 1, 1944, is 28,556,000 but this does not include the value of turkeys or eggs. A conservative estimate of one dollar per bird places the value of the chicken crop in this state at $28,556,000. When to this figure is added the value of the eggs that will probably be produced by these flocks at $2.50 each for 25 million laying hens—which is probably too low—the total sum is $96,056,000. To this also should be added the value of turkeys, geese and ducks, upon which figures are not available. The turkey crop in Illinois will run into millions of dollars. Dividing the income of the poultry industry in Illinois by 400, the number of practicing veterinarians in the state, we find that $240,140 is the value of the poultry industry for each veterinary practitioner in the state. Dr. Cliff Carpenter places the value of poultry at a quarter of a million dollars for every veterinarian in the United States, regardless of whether or not he is in practice—and there are still farm belt veterinarians who wonder if it is worth their while to give their clients any assistance in handling poultry problems! We wonder if these men realize that there are

*From a report of the Committee on Poultry Pathology to the annual meeting of the Illinois Veterinary Medical Association, Springfield, Jan. 21-22, 1944. W. A. Beard, C. L. Lehman, J. R. Christian, A. C. Bolle, Committee.

hatcheries, and so-called poultry health stations who are netting from $5,000 to $10,000 a year—perhaps right in a veterinarian's own territory.

Doctor Carpenter predicted 522 million laying hens in the United States as of January 1, 1944, and that a conservative estimate indicates that 125 million of them will be dead before the end of the year. On a percentage basis this 23.94%, or approximately one of every four hens that go into the laying house, will die before the end of the first laying season. No other branch of animal husbandry sustains this heavy mortality rate—nor could it be profitable if it did.

The poultry industry has long been in need of good veterinary service, but since it has been so slow in coming, the poultryman has been forced to do the best he can. Poultry remedy houses have long been alert to the

situation and have built up a system, which has become the accepted manner for the average poultry owner to solve his troubles. I am unable to get any close estimate on the sum spent each year for poultry remedies. Doctor Carpenter believes it to be between five and 15 million dollars. If we take the mean of those sums, which is 10 million and divide it among the nine thousand veterinary practitioners in the United States we find the average for each veterinarian could be a poultry practice of over $1100 each year.

There are few specifics for poultry diseases. At present we have but two specific vaccines—fowl pox vaccine and laryngotracheitis vaccine. However, if these two conditions were adequately controlled it would save thousands of birds annually. Infectious coryza, or colds, as the poultryman calls it, frequently takes a heavy toll from the profits, in recently housed pullets. Sulfa drugs may prove helpful; further experimentation is in order. The greatest loss from a single cause is undoubtedly due to the leucosis complex. So far, we have but little to offer our clients for this ailment. Sanitation seems to be of but little value as often the heaviest losses occur on premises where the greatest effort is made to maintain cleanliness. The subject of poultry pathology is large and is rapidly expanding. For a thorough discussion of the subject we recommend "Diseases of Poultry" published by the Iowa State College Press at Ames. This work, of a thousand pages, is the latest and most scientific treatise on poutry diseases that we have yet seen.

For those who contemplate entering the field of poultry practice we would emphasize the necessity of knowing poultry in health as well as disease. The experienced poultryman will evaluate one very quickly by one's "bedside manner" in the poultry house. One should be able to recognize all the leading breeds, estimate the housing capacity, check ventilating facilities and be able to offer suggestions for the improvement of existing insanitary practices. This will include dropping board arrangement, feeding and watering equipment, and floor covering. It is exceedingly rare to go into a poultry house where there are not one or more conditions that need correcting. Brooder house troubles are just around the corner. Of all phases of poultry practice, this one is the greatest headache. When one eliminates faulty management, such as incorrect or variable temperatures, gross overcrowding, etc., and a heavy loss still continues, one may be sure that the trouble goes back to some prior condition. Many hatchery flocks are incorrectly fed and managed and the chicks produced from such flocks just simply don't do right. Hatching eggs may be held at temperatures that are too high or too low, or they may be held too long. Many things contribute to the production of chicks that are not what they should be and the consequent mortality cannot be avoided. Pullorum disease still kills thousands of chicks every year, in spite of all the pullorum testing that is done.

The control of external parasites is generally understood by the poultryman. Phenothiazine is proving valuable in the control of cecal worms and when properly used it may be the means of lowering the incidence of blackhead in turkeys. The greatest need that the poultryman has today for parasite control is a safe efficient tapeworm remedy. As the matter now stands he has been lulled into a sense of false security by the advertisements of remedy companies. They infer much but promise little, and on this basis they painlessly extract many thousands of dollars yearly from the poultry industry.

Every veterinarian is urged to consider his obligation to the poultry industry in order that the increased demands for poultry and eggs may be met. This may be considered a valuable effort to help the war effort and thereby bring a quicker return of peace to our country.

Canine Leptospirosis*

Of the diseases encountered by the veterinarian, canine leptospirosis still ranks as one of the highest mortality. This fact alone tends to keep the veterinarian alert for any new information pertaining to its diagnosis, prevention or treatment.

An early diagnosis of this disease is important if any form of treatment is to be effective. However, this is quite often impossible for two reasons:

1. Due to the rapid onset of this disease, with the resultant overpowering or paralyzing effect produced by the causative organisms and their toxins, many animals are moribund when first presented for treatment.

2. Since agglutinins do not appear in the blood until about seven days after the onset of the disease, the agglutination test generally is of little or no diagnostic aid to the practitioner during the first few days of the attack.

When one does encounter the type which terminates unfavorably and negative results are obtained when the simplified rapid agglutination test is used, one should perform a necropsy. Using a sharp scalpel, slice fairly small rectangular sections—between ⅛ and 1/16 of an inch in thickness—from the liver and the cortex of the kidneys. Place in a jar, suitable for mailing, containing a 10% solution of formalin and send, for examination, to a laboratory equipped to do this work. The leptospira organisms can sometimes be found upon microscopic examination of these tissues. When this is possible, the practitioner is sure of his diagnosis even though his treatment failed.

Prevention seems to be the point at which the problem of leptospirosis should be attacked. Since rodents, especially rats, are the principal natural pool of infection, steps should be taken to exterminate them. It is a well-known fact that 10% of wild rats and 45% of sewer rats excrete *Leptospira icterohaemorrhagiae* in the urine.

The blood serum from infected rats will react serologically also to *Leptospira canicola*, although the canicola species has not been isolated from rats.

The icterohaemorrhagiae species is responsible for Weil's disease in man, and the canicola species for canicola fever in man. Since rats are the principal vectors of this disease and their presence in a given area constitutes a public health menace, it would seem that public health authorities should take measures for the elimination or control of these pests.

A forward step toward the prevention of this disease among dogs has been taken; the active immunization with a formalized culture of leptospira organisms. This experiment was conducted by Alicata[1] in Honolulu. More research is necessary before evaluation of these results can be made, since only five dogs were used in this experiment. However, the results seem promising and similar work by individuals or laboratories should be encouraged.

There are no specifics with which to combat leptospirosis in dogs. As one veterinarian ably puts it, "The wide range of therapy employed, which includes nutritional, bactericidal, biological and supportive agents, clearly indicates the dilemma of the practitioner when leptospirosis is encountered, especially in the later stages, which is usually the case."

*Excerpts from report of Special Committee on Diseases of Small Animals; P. J. Meginnis, Chairman, presented to the annual meeting, Illinois Veterinary Medical Association, Springfield, Jan. 21-22, 1944.

[1] Alicata, Joseph E., Active immunization of dogs against leptospirosis by the use of formalized leptospira antigen. *J. Am. Med. Ass'n.* 102:6, pp. 472-473, 1943.

Colt Survives Severed Jugular

May 7, 1944, Mr. Paul Talley, who lives 12 miles east of Lewisburg, Tennessee, telephoned me to come at once to his place as he had a colt "with its throat cut."

I found a colt, five weeks of age, with what appeared to be one-fourth of his neck severed about six inches from the point of the shoulder on the left side.

The colt had become separated from its dam by a fence with a barbed wire on top and in trying, frantically, to get to her, had sawed its neck about one-fourth off.

Mr. Talley saw the accident and ran to the colt and grabbed the jugular vein which was pouring out blood. When the muscles were severed they retracted and left about six inches of the jugular hanging free. After holding the vein for a time the owner simply tied a knot in it, as one would in a cord and called me.

All hemorrhage had ceased when I arrived. I ligated the vein, well back in the tissues and cut it off near the ligation. The wound was sprayed with tincture of merthiolate and dusted well with a powder containing sulfanilamide, sulfathiazole and urea. An ample quantity of this powder was left with the owner with instructions to use it freely. The wound, which appeared perfectly clean, was not washed. A dose (1500 units) of tetanus antitoxin was administered and I saw the case no more.

About a month after the accident I saw Mr. Talley again and he reported that the animal was as frisky as any colt and the wound was nearly healed. He thought that but little scar would be left and plans to show the colt in the colt show this fall.

The interesting and unusual features of this case are, that the owner should have been

present when the accident occurred, that the jugular vein should be left hanging clear, that the owner should have had the presence of mind to stanch the flow of blood effectively by tying a knot in the jugular vein and thus save the animal's life and, perhaps also, that the colt at no time showed any inconvenience from loss of a vein that normally carries 50% of the return flow of blood from the head.

R. H. SMITH

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Uses of Artificial Insemination

The possible uses to which artificial insemination may be put can be grouped under two main headings:

(*a*) Livestock Improvement.

(*b*) Disease Control and Breeding Efficiency.

In most of the countries where artificial breeding has been adopted on a large scale, livestock improvement has been the main motive, but in one or two tropical or subtropical areas disease control has been an equally important incentive. I shall refer again to this later when considering the progress which artificial breeding has made in various countries.

Livestock Improvement—In most countries of the world there is a considerable difference between the performance, whether for meat or milk production, of the best animals and that of the average. This is particularly true of milk production where we are dealing with a commodity which can be accurately measured, and it is generally acknowledged in Britain that the milk yield of our national herd could be greatly improved by the more widespread use of first-class dairy bulls. But the number of such sires at any given time is limited and, therefore, the desired progress must of necessity be slow with the methods applied up to the present. By the use of artificial insemination, however, it is possible to mate superior sires with many times the number of females than would be possible under natural conditions. An example of what can be done in this respect has been reported from Russia,* where in one year 1,536 cows were inseminated from the semen of one bull and produced 1,490 calves and 15,016 ewes were inseminated from one ram and produced 15,662 lambs (Liskun, 1941). In one of the Danish breeding societies an outstanding bull was mated with about 900 cows during a single year (Rice, 1942). These figures probably represent the extreme limits, and it is not claimed that comparable numbers will be desirable or practical for routine organized breeding under the system of animal husbandry in practice in most countries.

Another advantage of artificial insemination is that the small dairy farmer can avail himself of the services of superior sires which under present conditions are available only to the owners of large herds, for when the purchase and maintenance costs of a valuable sire are distributed amongst a large number of small owners, as in an organized artificial breeding association, the individual cost is low.

One very obvious problem which arises when considering this aspect of artificial insemination is as to what constitutes a first-class sire. In theory there is only one answer, namely, a proved sire, *i.e.*, one whose ability to transmit desirable characteristics is known. In dairy cattle breeding, most sires are never proved because they have been destroyed before their worth has become known. Under present conditions, a bull has reached the age of five or six years before even the first of his daughters comes into production and would take a few more years before there was a sufficient number of daughters to indicate whether the sire was transmitting milking ability or not. Quite obviously few individual farmers can keep one bull for this length of time, for in the average herd it would mean that the bull would have to be used on his own daughters. With co-operative artificial breeding, on the other hand, it is possible to have a sufficient number of daughters to prove a bull *earlier* than under natural service conditions, and no individual owner need have more than one or two females bred to the bull before he is proven, and so greatly distributing the risk of the bull turning out a failure. Thus organized artificial breeding may produce an entirely new concept of what a proven bull is, for we can expect to judge him on say 100 daughters rather than on five to ten, as is done under present conditions.

—*N. J. Scorgie.*

* Reprinted from the *Veterinary Record*, 55:5, p. 57.

★ ★ ★ BUY WAR BONDS ★ ★ ★
AND HOLD THEM

Book Review

Diagnostic Methods in Veterinary Medicine. By *Geo. F. Boddie,* B.Sc., M.R.C.V.S., Professor of Medicine, Royal Dick Veterinary College. With a chapter on Clinical Hematology by *H. H. Holman,* Ph.D., M.R.C.V.S., Pathologist-Animal Disease Research Association, Moredun Institute, Edinburgh. 328 pages, 30 illustrations. Published by Oliver and Boyd, Ltd., Edinburgh, Scotland. Price $3.50.

The plan of this work comprises an introduction in which the development of symptoms and methods of examination are discussed. This is followed by the preliminary general examination which is, in the main, applicable to all species. A commendable feature in this, and in the discussion of special examinations, is numerous examples illustrating the use of methods or the conditions under which the symptoms, that are discussed, may occur.

The special examinations are discussed under the following heads: Digestive system of the horse, of ruminants, of swine and of the dog and cat; the respiratory system; the circulatory system; the urinary system; the nervous system; the skin; the lymphatic system; the eye; the ear; the genitalia; the muscles, bones and joints; allergic reactions; tuberculin and mallein tests; collection of material for laboratory tests; urine analysis; clinical bacteriology; clinical helminthology and clinical hematology.

The discussions are comprehensive and include the latest information on the detection of animal disease. They begin on a plane rather elementary for practitioners, but it should be remembered the text is for both students and practitioners. It is a very satisfactory and useful work; a great improvement upon Malkmus' "Clinical Diagnosis," which has monopolized this field in American veterinary literature for two-score years.

Any book reviewed in these pages, or any other book if available, may be obtained by remitting the published price to VETERINARY Medicine, 7632 S. Crandon Ave., Chicago 49. Bulletins and Circulars should be requested direct from the address given in the notice. Generally they are supplied free unless a price is stated.

★ ★ ★ BUY WAR BONDS ★ ★ ★
AND HOLD THEM

Abstracts

Bovine Serum a Substitute for Human Plasma

If bovine serium is heated[33] to 72° C. to destroy the antibodies while rendering the proteins uncoagulable by adding 0.2% formaldehyde and ammonia, it can be administered rapidly and in large amounts to man with safety.

Soybean Meal an Adequate Protein for Growing Chicks

Owing to the inadequacy of the supplies of milk by-products, meat scrap and fish meal for poultry feeding, the authors[23] undertook a study of the value of soybean meal and various combinations of soybean meal and other protein concentrates in the ration for growing chicks. Their conclusions are:

Soybean meal is a satisfactory substitute for all animal protein supplements. When soybean meal is used alone it should constitute 35% of the ration for growing chicks.

Meat scrap and dried skim milk at levels of 3 and 5% respectively improved the soybean meal diet sufficiently to warrant their use when available at a reasonable price.

Two per cent of sardine meal combined with the soybean meal made a diet superior to all others.

Either over or under heat-treating the meal, deteriorates its value as the sole protein supplement for growing chickens.

Useful Bulletins, Circulars, Etc.

Wartime Swine Production.—A booklet containing the recommendations of various committees. Wartime Swine Industry Council, Department of Agriculture, State House, Des Moines, Ia.

History of Livestock Raising in the United States.—A history of livestock raising in this country for the period 1607-1860 by James Westfall Thompson, Agricultural History Series No. 5, U. S. Dept. of Agr., Washington, D. C.

Livestock Sanitary Laws of Montana.—A 200-page booklet containing the laws for the prevention and control of the diseases of livestock including rules, regulations and orders. Montana Livestock Board, Helena, Montana.

Plenty of Protein Available.—Because legume hay is not cut at the right stage the protein loss is 20%. Poor curing accounts for much vitamin loss. Simple rules for right time to cut the various legume hays to obtain the greatest protein yield and of proper methods of curing to conserve the vitamin content are given in OWI Leaflet No. 97 "Making of High-Grade Hay," Office of War Information, U. S. Dept. Agr., Washington 25, D. C.

[33] Edwards, F. R., Despeciated bovine serum; substitute for human plasma. *British Med. J.* 1, p. 73, 1944.

[23] Hammond, John C. and Titus, Harry W. The use of soybean meal in the diet of growing chicks. *Poul. Sci.* 23:1, pp. 49-57, 1944.